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A Classified List, issued quarterly, containing the Names and Addresses of all American Manufacturers of Automobiles, Commercial Vehicles, Motor Boats, Motor Cycles and of all makers of component Parts, Accessories, Machinery, Tools and Shop Equipment. Contains also "Tables and Data for Engineers" and other pertinent information.

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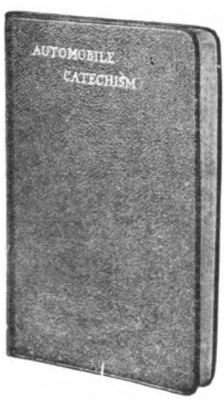
For the Use of Owners and Drivers of Cars Fitted with Internal Combustion Motors



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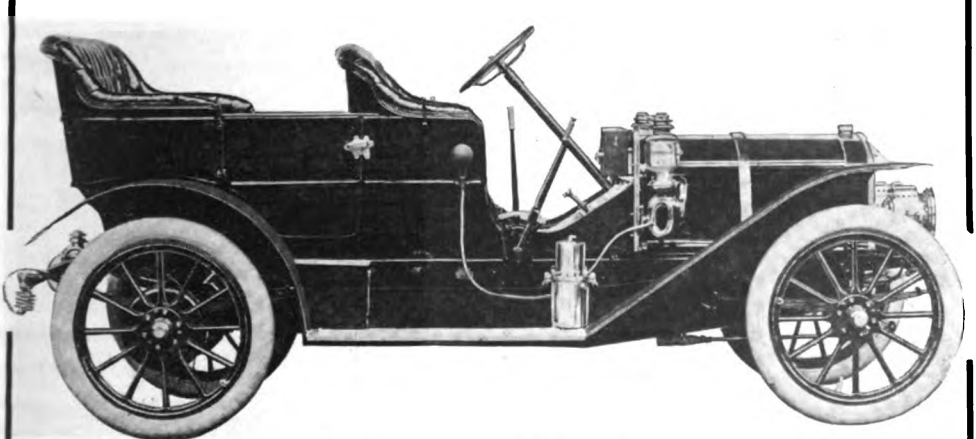

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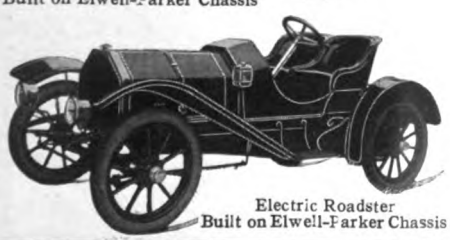

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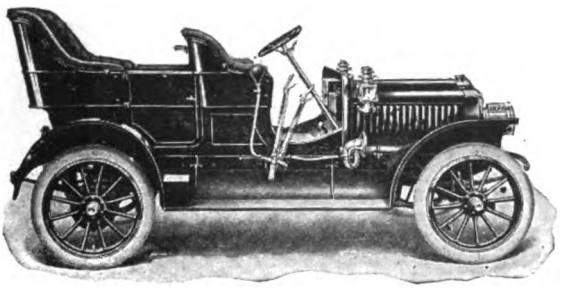

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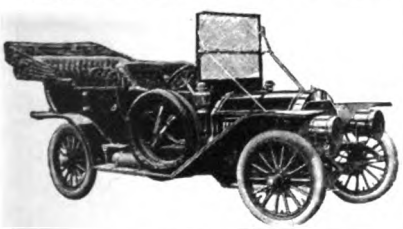

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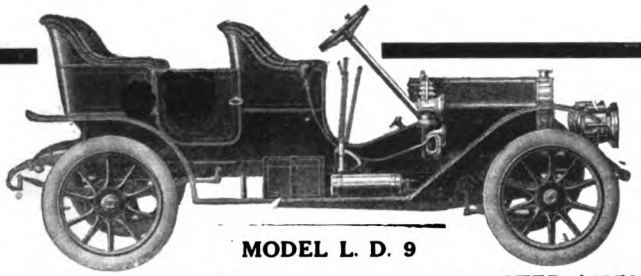
KISSEL CARS FOR 1909



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PLEASURE VEHICLES

GASOLINE VEHICLES

A-K—See Allen-Kingston Motor Car Co.

ABENDROTH & Root Mfg. Co., Newburgh, N. Y. "Frontenac."

ACME Motor Car Co., Reading, Pa.

ADAMS-FARWELL—See Adams Co.

ADAMS Co., Dubuque, Ia. "Adams-Farwell."

ALLEN-KINGSTON Motor Car Co., Kingston, N. Y. "A.-K."

AMERICAN Locomotive Co., Providence, R. I.

AMERICAN Mercedes—See Daimler Mfg. Co.

AMERICAN Mors—See St. Louis Car Co.

AMERICAN Motor Car Co., Illinois & Henry Sts., Indianapolis, Ind.

ANGUS Automobile Co., Angus, Neb. "Fuller."

APOLLO—See Chicago Recording Scale Co.

APPERSON Bros. Automobile Co., Kokomo, Ind.

ATLAS Motor Car Co., 88 Birnie Ave., Springfield, Mass.

AUBURN Automobile Co., Auburn, Ind.

AUSTIN Automobile Co., Grand Rapids, Mich.

AUTOCAR Co., Ardmore, Pa.

AUTO-CAR Equipment Co., Edward St. & Delaware Ave., Buffalo, N. Y. (See page 37.)

AUTO Vehicle Co., S. Main, Tenth, & S. Los Angeles Sts., Los Angeles, Cal. "Tourist."

BAILEY Automobile Co., Alden & Logan Sts., Springfield, Mass.

BARTHOLOMEW Co., Peoria, Ill. "Glide."

BELDEN Motor Car Co., 720 Bessemer Bldg., Pittsburg, Pa.

BENNER Motor Car Co., Thoroughfare Bldg., New York, N. Y.

BLOMSTROM Manufacturing Co., Leib & Wight Sts., Detroit, Mich.

BLUE STREAK—See Logan Construction Co.

BRUSH Runabout Co., 14 Baltimore Ave., W., Detroit, Mich.

BUCKEYE Mfg. Co., 1813 Columbus Ave., Anderson, Ind. (See page 27.)

BUICK Motor Co., Flint, Mich.

C. F.—See Cornish-Friedberg Motor Car Co.

CADILLAC Motor Car Co., 1342 Cass Ave., Detroit, Mich.

CAMERON Car Co., Beverly, Mass. (See page opposite.)

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CHALMERS-DETROIT Motor Co., Detroit, Mich.

CHAMPION—See Famous Mfg. Co.

CHICAGO Recording Scale Co., Waukegan, Ill. "Apollo."

CHRISTOPHER BROS., 1049 Sheffield Ave., Chicago, Ill. "Triumph."

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COLUMBIA Electric Co., Knightstown, Ind. "Leader."

COLUMBIA—See Electric Vehicle Co.

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COMMERCIAL Automobile Co., 1408 W. 56th St., Chicago, Ill. "Hennegin."

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CRAWFORD Automobile Co., Hagerstown, Md.

DAIMLER Mfg. Co., 959 Steinway Ave., Long Island City, N. Y. "American Mercedes."

DARRACQ & Co., A., 33 Quai de Suresnes, Suresnes, France.
(See page 19.)

DAYTON Motor Car Co., Dayton, O. "Stoddard-Dayton."
(See page 39.)

DE LUXE Motor Car Co., River & Clark Sts., Detroit, Mich.

DERAINE—See Simplex Mfg. Co.

DESERT FLYER—See Nevada Motor Car Co.

DIAMOND T Motor Car Co., 3 Huron St. Chicago, Ill.

DIXIE FLYER—See Southern Motor Ca. Factory.

DORRIS Motor Car Co., 22-38 S. Sarah St., St. Louis, Mo.

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ELECTRIC Vehicle Co., Hartford, Conn. "Columbia."

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ELMORE Mfg. Co., Clyde, O.

EVANSVILLE Automobile Co., Fifth & Locust Sts., Evansville, Ind. "Simplicity."

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FIRESTONE—See Columbus Buggy Co.

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FORD Motor Co., Piquette Ave. & Beaubien St., Detroit, Mich.

FORT Pitt Motor Mfg. Co., New Kensington, Pa. "Pittsburg Six."
(See page opposite.)

FOUR Traction Auto Co., Mankato, Minn. "Kato."

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRANKLIN Mfg. Co., H. H., 400 S. Geddes St., Syracuse, N. Y.

FRAYER-MILLER—See Lear Automobile Co.

FRONTENAC—See Abendroth & Root Mfg. Co.

FULLER—See Angus Automobile Co.

GAETH Automobile Co., 2553 W. 25th St., Cleveland, O.

GALE—See Western Tool Works.

GARFORD Co., Elyria, O.

GEARLESS Motor Car Co., Rochester, N. Y.
(See page 39.)

GLIDE—See Bartholomew Co.

GREAT ARROW—See Pierce Co.

GREAT WESTERN—See Model Automobile Co.

GROUT Automobile Co., Orange, Mass.

HALLIDAY—See Streator Motor Car Co.

HAYNES Automobile Co., Kokomo, Ind.
(See page 35.)

HENNEGIN—See Commercial Automobile Co.

HERRESHOFF Motor Car Co., Detroit, Mich.

HOL-TAN—See Moon Motor Car Co.

HUPP Motor Car Co., Bellevue & St. Paul Aves., Detroit, Mich.

IMPERIAL Motor Car Co., 601 W. Third St., Williamsport, Pa.

INTERNATIONAL Harvester Co., Harvester Bldg., Chicago, Ill. "Farmers."

IOWA Motor Car Co., Kellogg, Ia.

JACKSON Automobile Co., E. Main & Horton Sts., Jackson, Mich.

JEFFERY & Co., Thos. B., Kenosha, Wis. "Rambler."
(See page 17.)

JENKINS Motor Car Co., 1181-85 University Ave., Rochester, N. Y.

JEWEL Motor Car Co., Massillon, O.

JOHNSON Service Co., 149-53 Michigan St., Milwaukee, Wis.
(See page 257.)

KATO—See Four Traction Auto Co.

KISSELKAR—See Kissel Motor Car Co.

KISSEL Motor Car Co., 128 Kissel Ave., Hartford, Wis. "Kisselkar."
(See page 23.)

KLINK Motor Car Mfg. Co., Dansville, N. Y.

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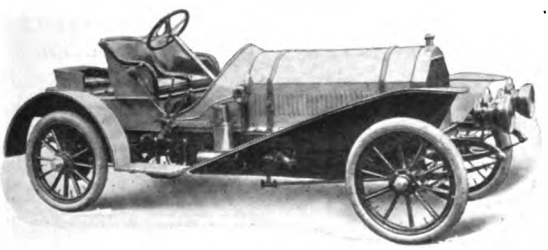

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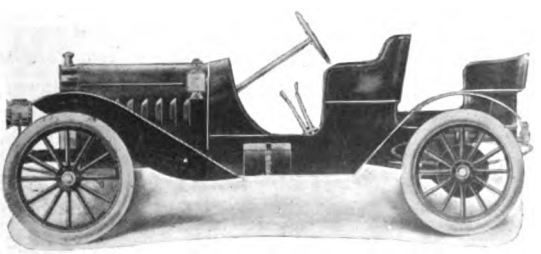

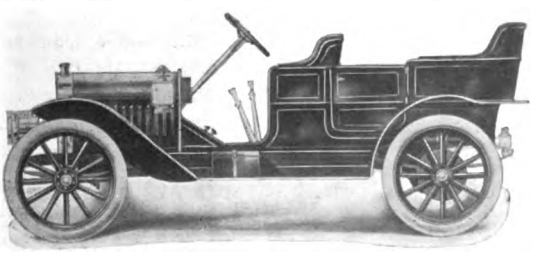

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Horse Power 25
Wheel Base 100 inches
Sliding Gear Transmission
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Weight 1,800 lbs.
Tires, 32 in. x 3 1-2 in.

REGAL MOTOR CAR CO., DETROIT MICH.

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(Continued)

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KNOX Automobile Co., 53 Wilbraham Road, Springfield, Mass.

LAMBERT—See Buckeye Mfg. Co.

LAUTH-JUERGENS Motor Car Co., 94-96 Rawson St., Chicago, Ill.

LEADER—See Columbia Electric Co.

LEAR Automobile Co., Oscar, Springfield, O. "Frayer-Miller."

LEHR Agricultural Co., Fremont, O.

LENDE Automobile Mfg. Co., 407 Century Bldg., Minneapolis, Minn.

LOCOMOBILE Co. of America, Seaside Park, Bridgeport, Conn.

LOGAN Construction Co., Chillicothe, O. "Blue Streak."

LOZIER Motor Co., Broadway & 55th St., New York, N. Y.

LUVERNE Automobile Co., Luverne, Minn.

MAPLEBAY Mfg. Co., Crookston, Minn.

MARION Motor Car Co., Indianapolis, Ind.

MARMON—See Nordyke & Marmon Co.

MASON Motor Car Co., E. Fifth & Vine Sts., Des Moines, Ia.

MATHESON Motor Car Co., Wilkes-Barre, Pa.

MATTHEWS Motor Co., Camden, N. J. "Sovereign."

MAXWELL-BRISCOE Motor Co., Tarrytown, N. Y.
(See page 21.)

MERCEDES Motor Mfg. Co., New Kensington, Pa.
(See pages 298 and 413.)

METEOR Motor Car Co., Davenport, Ia.

METZ, C. H., Waltham, Mass., "Waltham-Orient."

MIDDLEBY Auto Co., Reading, Pa.

MIDLAND Motor Co., Moline, Ill.
(See page 511.)

MITCHELL Motor Car Co., 440 Mitchell St., Racine, Wis.
(See page 511.)

MODEL Automobile Co., Peru, Ind. "Great Western."

MODERN Tool Co., Fourth & State Sts., Erie, Pa. "Payne-Modern."

MOLINE Automobile Co. (E. Moline), Moline, Ill.

MONARCH Machine Co., 307 E. First St., Des Moines, Ia.

MONARCH Motor Car Co., Chicago Heights, Ill.

MONSEN, A., 57 Maple St., Chicago, Ill.

MOON Motor Car Co., Main & Cornelia Sts., St. Louis, Mo. "Hol-Tan."

MORA Motor Car Co., Newark, N. Y.

MORSE—See Easton Machine Co.

NAPIER Motor Co. of America, Bartlett Square (Jamaica Plain), Boston, Mass.

NATIONAL Motor Vehicle Co., 2100 E. 32d St., Indianapolis, Ind.

NEVADA Motor Car Co., Masonic Temple Bldg., Reno, Nev. "Desert Flyer."

NORDYKE & Marmon Co., 1101-31 W. Morris St., Indianapolis, Ind. "Marmon."
(See page 31.)

OAKLAND Motor Car Co., Pontiac, Mich.

OLDSMOBILE—See Olds Motor Works.

OLDS Motor Works, Lansing, Mich. "Oldsmobile."

ORIENT—See Waltham Mfg. Co.

OVERLAND Automobile Co., Indianapolis, Ind.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PAGE Gas Engine Co., Adrian, Mich.

PAYNE-MODERN—See Modern Tool Co.

PEERLESS Motor Car Co., Quincy Ave. & E. 93d St., Cleveland, O.

PENNSYLVANIA Auto Motor Co., Bryn Mawr, Pa.

PETREL Motor Car Co., Kenosha, Wis.

PICKARD Bros., Brockton, Mass.

PIERCE-ARROW—See Pierce Co.

PIERCE Co., Geo. N., Buffalo, N. Y. "Great Arrow."

PIERCE Engine Co., 22-60 Clark St., Racine Wis. "Pierce-Racine."

PIERCE-RACINE—See Pierce Engine Co.

PITTSBURG SIX—See Fort Pitt Motor Mfg Co.

POPE-HARTFORD—See Pope Mfg. Co.

POPE-TOLEDO—See Pope Motor Car Co.

POPE Mfg. Co., Hartford, Conn. "Pope-Hartford."

POPE Motor Car Co., Toledo, O. "Pope Toledo."

POSTAL Auto & Engine Co., 125 W. 15th St., Cincinnati, O.

PREMIER Motor Mfg. Co., Indianapolis, Ind.
(See page 39.)

PULLMAN—See York Motor Car Co.

RAINIER Co., Saginaw, Mich.

RAMBLER—See Jeffery & Co.

REGAL Motor Car Co., Detroit, Mich.
(See page 27.)

REO Motor Car Co., Lansing, Mich.

RICKETTS Automobile Works, So. Bend, Ind.

RIDER-LEWIS Motor Car Co., Anderson, Ind.

RIVIERA—See Schnader, Milton H.

ROSSLER Mfg. Co., C., Buffalo, N. Y.

ROYAL Tourist Car Co., Cleveland, O.

ST. JOE Motor Car Co., Elkhart, Ind.

ST. LOUIS Car Co., 5200 N. Second St., St. Louis, Mo. "American Mors."

SCHNADER, Milton H., 724 N. Third St., Reading, Pa. "Riviera."

SELDEN Motor Vehicle Co., 72 North St., Rochester, N. Y.

SENATOR—See Victor Automobile Co.

SHARP, Wm. H., Trenton, N. J. "Sharp Arrow."

SHAWMUT Motor Co., Stoneham, Mass.

SILENT KNIGHT—See Knight & Kilbourne.

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Dallas, Texas—Studebaker Bros. Mfg. Co., 317-319 Elm Street.

Denver, Colo.—Studebaker Automobile Co., 1532-1538 Broadway.

Kansas City, Mo.—Studebaker Bros. Mfg. Co., 13th and Hickory Streets.

New York City—Studebaker Bros. Co. of New York, Broadway and 48th Streets.

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Portland, Ore.—Studebaker Bros. Co., Northwest, 330-336 E. Morrison St.

Salt Lake City, Utah—Studebaker Bros. Co. of Utah, 157 State Street.

San Francisco, Cal.—Studebaker Bros. Co. of California, Mission and Fremont Sts.

Seattle, Wash.—Studebaker Bros. Co. Northwest, 308 First Avenue, South (*Sub-Branch*)

Selling Agency: Lord Motor Car Co., Los Angeles, Cal.

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PLEASURE VEHICLES
Continued

GASOLINE VEHICLES (Continued)

SIMPLEX Automobile Co., 614 E. 83d St., New York, N. Y.

SIMPLEX Mfg. Co., 7500 Quincy Ave., Cleveland, O. "Deraine."

SIMPLEX Motor Car Co., Mishawaka, Ind.

SIMPLICITY—See Evansville Auto Co.

SIX-TEEN-SIX—See Winton Motor Carriage Co.

SMITH Automobile Co., Jefferson & Adams Sts., Topeka, Kan.

SOUTHERN Motor Car Factory, 709-11 Louisiana St., Houston, Tex. "Dixie Flyer."

SOVEREIGN—See Matthews Motor Co.

SPEEDWELL Motor Car Co., Edgemont, Dayton, O.

SPRINGFIELD—See Medcraft Automobile Co.

STEARNS Co., F. B., Euclid & Lake View Aves., Cleveland, O.

STERLING—See Elkhart Motor Car Co.

STEVENS Automobile Co., Leo E., Ottumwa, Ia.

STEVENS-DURYEA Co., Chicopee Falls, Mass.

STILSON Motor Car Co., 92 Renne Ave., Pittsfield, Mass.

STODDARD-DAYTON—See Dayton Motor Car Co.

STREATOR Motor Car Co., Streator, Ill. "Halliday."

STUDEBAKER Automobile Co., 1372 E. 12th St., Cleveland, O. (See page 29.)

THOMAS FLYER—See Thomas Motor Co.

THOMAS Motor Co., E. R., 1200 Niagara St., Buffalo, N. Y. "Thomas Flyer."

TINCHER Motor Car Co., 310-17 S. St. Joe St., South Bend, Ind.

TOURIST—See Auto Vehicle Co.

TRIUMPH—See Christopher Bros.

TWYFORD Motor Car Co., Brookville, Pa.

U. S. Motor Car Co., Upper Sandusky, O.

VELIE Motor Vehicle Co., Moline, Ill.

VICTOR Automobile Co., Ridgeville, Ind. "Senator."

VICTORY Motor Car Co., San Jose, Cal.

WALTER Auto Co., Whitehead Road, Trenton, N. J.

WALTHAM-ORIENT—See Metz, C. H.

WAYNE Works, Richmond, Ind.

WELCH Motor Car Co., Pontiac, Mich.

WESTERN Tool Works, Galesburg, Ill. "Gale."

WILCOX Motor Car Co., H. E., 11th Ave. & Marshall St., N. E., Minneapolis, Minn. "Wolfe."

WINTON Motor Carriage Co., Berea Road, Cleveland, O. "Six-teen-six."

WOLFE—See Wilcox Motor Car Co.

WOODS Motor Vehicle Co., Chicago, Ill.

YORK Motor Car Co., George St., York, Pa. "Pullman."

HIGH WHEEL OR BUGGY TYPE VEHICLES

A. B. C. Motor Vehicle Mfg. Co., 3915 Morgan St., St. Louis, Mo.

ADVANCE Motor Vehicle Co, Miamisburg, O.

ANDERSON Carriage Mfg. Co., Anderson, Ind.

BENDIX Co., 49th Ave. & Bloomingdale Road, Chicago, Ill. (See page 501.)

BLACK Mfg. Co., 124-28 E. Ohio St., Chicago, Ill.

BUGGYAUT—See Duryea, Chas. E.

BUGGYCAR CO., John & Armory Sts., Cincinnati, O.

BUGMOBILE Co., 208 Wabash Ave., Chicago, Ill.

BUICK Motor Co., Flint, Mich.

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill. "Duer." (See page 237.)

COOK Motor Vehicle Co., 1022 N. Broadway, St. Louis, Mo. "Simplo."

DE SCHAUM Motor Syndicates, 119-21 Grant St., Buffalo, N. Y. "Little Buffaloes."

DUER—See Chicago Coach & Carriage Co.

DURYEA, Chas. E., Reading, Pa. "Buggyaut."

ECONOMY Motor Buggy Co., Joliet, Ill.

EUREKA Motor Buggy Co., 4500 Morgan St., St. Louis, Mo.

FAIRBURY Motor Car Works, Main & Sixth Sts., Fairbury, Ill.

FEDERAL—See Rockford Automobile & Engine Co.

FULLER Buggy Works, Jackson, Mich.

GARRETT Machine Works Co., Garrett, Ind.

GRAVES & Congdon Co., Amesbury, Mass.

HAYDOCK Automobile Mfg. Co., D. W., 1930 Chestnut St., St. Louis, Mo.

HOBBIE Automobile Co., Maple & Fourth Sts., Hampton, Ia.

HOLSMAN Automobile Co., 350 Monadnock Block, Chicago, Ill. (See page opposite.)

INTERNATIONAL Automobile Co., 1245 Wabash Ave., Chicago, Ill. (See page opposite.)

JEWEL Motor Car Co., Massillon, O.

KEARNS Motor Buggy Co., Beavertown, Pa.

LINCOLN Motor Vehicle Co., 512 Pulaski St., Lincoln, Ill.

LITTLE Buffaloes—See De Schaum Motor Syndicates.

McDOWELL Bros. Mfg. Co., Auburn, Ind.

McINTYRE Co., W. H., Auburn, Ind.

MIER Carriage & Buggy Co., Ligonier, Ind.

MONITOR Automobile Works, 1600 N. Halsted St., Chicago, Ill. (See page 21.)

MOTOR Buggy Mfg. Co., Columbia Heights, Minn.

PATTERSON Auto Co., Flint, Mich.

PEETS Mfg. Co., C. S., 60 W. 43d St., New York, N. Y.

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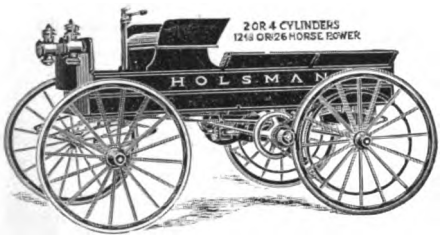

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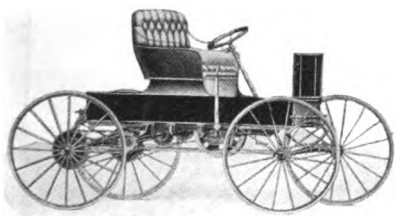

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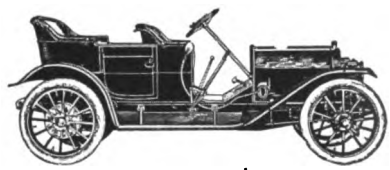

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PRACTICAL Automobile Co., Genoa, Ill.

RELIABLE-Dayton Motor Car Co., 21 N. May St., Chicago, Ill.

ROCKFORD Automobile & Engine Co., Rockford, Ill. "Federal." (See page 23.)

RUTH Automobile Co., North Webster, Ind.

SCHACHT Mfg. Co., 2727 Spring Grove Ave., Cincinnati, O.

SIMPLO—See Cook Motor Vehicle Co.

SINGLE Center Buggy Co., Fifth & Locust Sts., Evansville, Ind.

SNYDER & Co., D. D., Danville, Ill.

STAVER Carriage Co., 76th & Wallace Sts., Chicago, Ill.

STRATTON Carriage Co., C. H., Muncie, Ind.

SUCCESS Auto-Buggy Mfg. Co., 528 De Ballviere Ave., St. Louis, Mo.

UNION Carriage Co., Hall & Branch Sts., St. Louis, Mo.

VICTOR Automobile Mfg. Co., 3936-40 Laclede Ave., St. Louis, Mo.

WINNER Motor Buggy Co., 603 Fullerton Bldg., St. Louis, Mo.

ZIMMERMAN Mfg. Co., Auburn, Ind.

ELECTRIC VEHICLES

ANDERSON Carriage Co., Clay & Riopelle Aves., Detroit, Mich.

BABCOCK Electric Carriage Co., 226 W. Utica St., Buffalo, N. Y. (See page opposite.)

BAILEY & Co., S. R., Amesbury, Mass. (See page 511.)

BAKER Motor Vehicle Co., W. 80th St., Cleveland, O.

BRUNN'S Carriage Manufactory, 1140-48 Main St., Buffalo, N. Y.

BYRIDER Electric Auto Co., 1948-52 E. 55th St., Cleveland, O.

COLUMBIA—See Electric Vehicle Co.

COLUMBUS Buggy Co., Dublin St., Columbus, O.

ELECTRIC Vehicle Co., Hartford, Conn. "Columbia."

FRITCHLE, Oliver P., 1449 Clarkson St., Denver, Col.

GENERAL Vehicle Co., Borden & Review Aves., Long Island City, N. Y.

LANSDEN Co., 54 Lackawanna Ave., Newark, N. J.

MAXIM-GOODRIDGE Co., Hartford, Conn.

RAUCH & Lang Carriage Co., 1028 W. 25th St., Cleveland, O. (See page 37.)

STUDEBAKER Automobile Co., 1372 E. 12th St., Cleveland, O. (See page 29.)

WAVERLY Co., Indianapolis, Ind.

WOODS Motor Vehicle Co., Chicago, Ill.

STEAM VEHICLES

CLARK, Edward S., 272 Freeport St., Boston, Mass.

JAY Motor Co., Webb, 2335-39 State St., Chicago, Ill.

LANE Motor Vehicle Co., Poughkeepsie, N.Y.

MICHIGAN Steam Motor Co., Pontiac, Mich.

ROSS, Louis S., Crafts St., Newtonville, Mass.

STANLEY Motor Carriage Co., Newton, Mass.

WHITE Co., St. Clair & E. 79th Sts., Cleveland, O.

COMMERCIAL VEHICLES

GASOLINE COMMERCIAL VEHICLES

AMERICAN Machine Mfg. Co., Marion, Ind. "Commerce."

AMERICAN Motor Truck Co., Lockport, N. Y. (See page opposite.)

ATLAS Motor Car Co., 88 Birnie Ave., Springfield, Mass.

AUTO-CAR Equipment Co., Edward St. & Delaware Ave., Buffalo, N. Y. (See page 37.)

BRODESSER Motor Truck Co., Burleigh & Weil Sts., Milwaukee, Wis.

BUCKEYE Mfg. Co., 1813 Columbus Ave., Anderson, Ind. (See page 27.)

BUFFALO Auto-Truck & Motor Co., 123 Erie County Bank Bldg., Buffalo, N. Y.

CADILLAC Motor Car Co., Detroit, Mich.

CARTERCAR Co., Pontiac, Mich.

CHASE Motor Truck Co., 332 S. West St., Syracuse, N. Y.

COMMERCE—See American Machine Mfg. Co.

COMMERCIAL Motor Car Co., Times Bldg., New York, N. Y. (Importers.)

COMMERCIAL Motor Truck Co., Pine & Bell Sts., Plymouth, O. "Plymouth."

COPPOCK Motor Car Co., Decatur, Ind.

FRANKLIN Mfg. Co., H. H., 400 S. Geddes St., Syracuse, N. Y.

FRAYER-MILLER—See Lear Automobile Co.

GARY Taxicab Co., Chicago, Ill.

GIFFORD-PETTIT Mfg. Co., 1217 Devon St., Chicago, Ill.

GRABOWSKY Power Wagon Co., 68-72 Champlain St., Detroit, Mich.

HEWITT Motor Co., 6-10 E. 31st St., New York, N. Y.

IDEAL Mfg. Co., Portsmouth, O.

INTERNATIONAL Automobile Co., 1245 Wabash Ave., Chicago, Ill. (See page 31.)

KARBACH Automobile & Vehicle Co., 13th & Howard Sts., Omaha, Neb.

KNOX Automobile Co., 53 Wilbraham Road, Springfield, Mass.

LAMBERT—See Buckeye Mfg. Co.

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GASOLINE COMMERCIAL VEHICLES (Continued)

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LENDE Automobile Mfg. Co., Century Bldg., Minneapolis, Minn.

LOGAN Construction Co., Chillicothe, O.

MACK Bros. Motor Car Co., Allentown, Pa. "Manhattan."

MANHATTAN—See Mack Bros. Motor Car Co.

MAXWELL-Briscoe Motor Co., Tarrytown, N. Y. (See page 21.)

METZ, C. H., Waltham Mass. "Orient."

MITCHELL Motor Car Co., 440 Mitchell St., Racine, Wis. (See page 511.)

MONITOR Automobile Works, 1600 N. Halsted St., Chicago, Ill. (See page 21.)

ORIENT—See Metz, C. H.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PLYMOUTH—See Commercial Motor Truck Co.

POPE Mfg. Co., Hartford, Conn.

RAMBLER—See Jeffery & Co.

RAPID Motor Vehicle Co., 145 Rapid St., Pontiac, Mich. (See page 37.)

RELIANCE Motor Truck Co., Owosso, Mich.

REO Motor Car Co., Lansing, Mich.

SAMPSON Mfg. Co., Alden, Hawthorne & Mill Sts., Pittsfield, Mass.

SAYERS & Scovill, 2247-61 Colerain Ave., Cincinnati, O.

SEIBERT, The Shop of, 530-32 Ontario St., Toledo, O.

SEITZ Automobile & Transmission Co., Detroit, Mich.

STERNBERG Mfg. Co., Burleigh & Weil Sts., Milwaukee, Wis.

SULTAN Motor Co., Springfield, Mass.

THOMAS Wagon Co., Lititz, Pa.

TWYFORD Motor Car Co., Brookville, Pa.

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

VAN—See Wambeke & Sons.

WAMBEKE & Sons, H. G. V., 501 Jefferson Ave., Elgin, Ill. "Van."

WINKLEY Bros. Co., South Bend, Ind.

WORTH Motor Car Mfg. Co., Kankakee, Ill.

ELECTRIC COMMERCIAL VEHICLES

AUTO-CAR Equipment Co., Edward St. & Delaware Ave., Buffalo, N. Y. (See page 37.)

CHAMPION Wagon Co., Owego, N. Y.

COLUMBIA—See Electric Vehicle Co.

COMMERCIAL Truck Co., 27th & Brown Sts., Philadelphia, Pa.

COUPLE-Gear Freight Wheel Co., Buchanan St., Grand Rapids, Mich.

ELECTRIC Vehicle Co., Hartford, Conn. "Columbia."

ELWELL-PARKER Electric Co., 4225 St. Clair Ave., Cleveland, O. (See page 19.)

GENERAL Vehicle Co., Borden & Review Aves., Long Island City, N. Y.

LANSDEN Co., 54 Lackawanna Ave., Newark, N. J.

PITTSBURG Motor Vehicle Co., Pittsburg, Pa.

STUDEBAKER Automobile Co., 1372 E. 12th St., Cleveland, O. (See page 29.)

WAVERLY Co., Indianapolis, Ind.

STEAM COMMERCIAL VEHICLES

HALSEY, James T., 336 York Ave., Philadelphia, Pa.

MICHIGAN Steam Motor Co., Pontiac, Mich.

WHITE Co., St. Clair & E. 79th St., Cleveland, O.

MOTOR BOATS

ACKER, H., Tottenville, N. Y.

AMERICAN Boat & Machine Co., 3517 So. Second St., St. Louis, Mo.

AMERICAN Gasoline Motor Co., Baldwinsville, N. Y.

AMERICAN Yacht & Motor Co., Cherokee & DeKalb Sts., St. Louis, Mo.

ATLANTIC Co., Amesbury, Mass.

AYERS & Son, A., Nyack, N. Y.

BEERS Bros. Engine Co., Culver Road, Rochester, N. Y.

BELLOWS, M. S., Chateaugay Lake, N. Y.

BENTER, Worth S., Catskill, N. Y.

BONNEY, John C. G., 21 Platt St., New York, N. Y.

BROOKLYN Launch Works, Neptune Ave. & 12th St., Brooklyn, N. Y.

BROOKS Boat Mfg. Co., Saginaw, Mich.

CALIFORNIA Launch Works, Alameda, Cal.

CAMDEN Anchor-Rockland Machine Co., Rockland, Me. "Knox."

CAPE COD Power Dory Co., Main St., Wareham, Mass.

CONNECTICUT Construction Co., West Haven, Conn.

DAVIS Boat Works, Sandusky, O.

DETROIT Launch & Power Co., foot Holcomb Ave., Detroit, Mich.

DETROIT River Boat & Oar Co., foot of Eureka Ave., Wyandotte, Mich.

DUPLEX Roller Bushing Co., Belfast, Me.

DUTTON Engineering Co., Perth Amboy, N. J.

ELCO—See Electric Launch Co.

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FAY & Bowen Engine Co., 92 Lake St., Geneva, N. Y.

FRASER Hollow Spar & Boat Co., Greenport, L. I.

GAS Engine & Power Co., and Chas. L. Seabury Co., Morris Heights, New York, N. Y.

GERE Launch & Engine Works, 234 Palisade Ave., Yonkers, N. Y.

GLOBE Boat Co., Oswego, N. Y.

GODSHALK & Co., E. H., foot Cooper St., Camden, N. J.

GRAND Rapids Yacht & Engine Co., 96 Front St., Grand Rapids, Mich.

HANCKSCRAFT Co., 1200 Michigan Ave., Chicago, Ill.

HEPBURN, J. W., Toledo, O.

HOFFMAN Launch & Motor Works, W., 1253 N. Halsted St., Chicago, Ill.

HOLLAND Launch & Engine Co., Holland, Mich.

HUNTINGTON Mfg. Co., New Rochelle, N. Y.

IOWA Marine Engine & Launch Works, Bellevue, Ia.

JACOB, R., City Island, N. Y.

JONES & Laborde Co., Oshkosh, Wis.

KIDNEY & Son, Dan, West DePere, Wis.

KNOX—See Camden Anchor-Rockland Machine Co.

LAWLEY & Son Corp., Geo., 696 E. First St., South Boston, Mass.

LEGARE, J. L., Ogdensburg, N. Y.

LEIGHTON, H. J., 901 W. Fayette St., Syracuse, N. Y.

LOZIER Motor Co., Broadway & 55th St., New York, N. Y.

MANHASSET Shipbuilding & Repair Co., Port Washington, N. Y.

MATHER Corporation, C. B., 56 Merrimac St., Newburyport, Mass.

MATTHEWS Boat Co., Port Clinton, O.

MEDART, Fred, St. Louis, Mo.

MICHIGAN Steel Boat Co., 1252 Jefferson Ave., Detroit, Mich.

MILTON Point Shipyard, Rye, N. Y.

MILTON & Son, T. M., Brewerton, N. Y.

MINNESOTA Boat & Power Works, Stillwater, Minn.

MOORE Boat Works, Wayzata, Minn.

MULLINS Co., W. H., 124 Franklin St., Salem, O.

MURRAY & Tregurtha Co., 340 W. First St., Boston, Mass.

NEW YORK Yacht, Launch & Engine Co., New York, N. Y.

NIAGARA Motor Boat Co., N. Tonawanda, N. Y.

NOCK, F. S., East Greenwich, R. I.

NORWALK Launch Co., Norwalk, Conn.

OSHKOSH Boat Works, River & Mill Sts., Oshkosh, Wis.

OUTING Boat Co., Kankakee, Ill.

PALMER Bros., Coscob, Conn.

PELTON Gasoline Engine Works, Lyons, Ia.

PIERCE Engine Co., 22-60 Clark St., Racine, Wis.

PIERSON Boat Construction Co., Duluth, Minn.

POPE Boat Co., Fond-du-Lac, Wis.

RACINE Boat Co., 1201 16th St., Racine, Wis.

RACINE Boat Mfg. Co., Muskegon, Mich.

RANDOLPH Motor Car Co., 175 Randolph St., Chicago, Ill.

RED Wing Boat Mfg. Co., Red Wing, Minn.

RIPPLEY Hardware Co., Grafton, Ill.

SEITZ Co., F. A., 141 Frelinghuysen Ave., Newark, N. J.

STANDARD Motor Construction Co., 172 Whiton St., Jersey City, N. J.

ST. PAUL Boat Co., St. Paul, Minn.

STEARNS & McKay, Marblehead, Mass.

STURGEON Bay Boat Mfg. Co., Sturgeon Bay, Wis.

SUSQUEHANNA Marine Works Co., Havre de Grace, Md.

THOUSAND Island Boat & Engine Co., Morristown, N. Y.

TOPPAN Boat Mfg. Co., 9 Haverhill St., Boston, Mass.

TRUDELL & Co., Chas. J., Bay City, Mich.

TRUSCOTT Boat Mfg. Co., St. Joseph, Mich.

TUTTLE Co., D. M., Canastota, N. Y.

WESTERN Launch & Engine Works, Michigan City, Ind.

WHITE, T. L., Manchester, Mass.

WOOD, B. F., City Island, N. Y.

WRIGHT, U. G., Paulsboro, N. J.

YACHT, Launch & Engine Co., Philadelphia, Pa.

MOTOR CYCLES

AMERICAN Motor Co., 705 Centre St., Brockton, Mass. "Marsh." "Metz."

APACHE—See Brown & Beck.

ARMAC Motor Co., 472-78 Carroll Ave., Chicago, Ill.

AURORA Automatic Machinery Co., Aurora, Ill. "Thor."

AUTO-BI Co., 1443 Niagara St., Buffalo, N. Y.

BRADLEY Motor Co., C. E., 268 Diamond St., Philadelphia, Pa.

BRESSLER & Son, I. N., 406-08 E. Third St., Sterling, Ill. "Heaton."

BROWN & Beck, 1737 Champa St., Denver, Colo. "Apache."

CONSOLIDATED Mfg. Co., Toledo, O. "Yale." (See page 113.)

CROUCH Motor Co., Stoneham, Mass.

CURTISS Mfg. Co., G. H., Hammondsport, N. Y.

DUSENBERG, A. S., Garner, Iowa.

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MOTOR CYCLES (Continued)

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill. (See page 489.)

F. N.—See Ovington Motor Co.

FOWLER-MANSON-SHERMAN Cycle Mfg. Co., 240-54 W. Lake St., Chicago, Ill. "Manson."

HARLEY-DAVIDSON Motor Co., 38th & Chestnut Sts., Milwaukee, Wis.

HEATON—See Bressler & Son.

HENDEE Mfg. Co., 837 State St., Springfield, Mass. "Indian."

HILAMAN Co., A. H., Moorestown, N. J.

HORNECKER Motor Mfg. Co., Geneseo, Ill. "Torpedo."

HUDSON Mfg. Co., Hudson, Mich.

ILLINOIS Motor Works, 719-23 Sheffield Ave., Chicago, Ill.

INDIAN—See Hendee Mfg. Co.

MANSON—See Fowler - Manson - Sherman Cycle Mfg. Co.

MARSH—See American Motor Co.

MAYO Damper Co., 355 Walnut St., Pottstown, Pa.

MERKEL-LIGHT Motor Co., Pottstown, Pa.

MESCO—See Motorcycle Equipment & Supply Co.

METZ—See American Motor Co.

MOTORCYCLE Equipment & Supply Co., 4 Lake St., Hammondsport, N. Y. "Mesco."

NEW Era Gas Engine Co., 9 Dale Ave., Dayton, O.

OVINGTON Motor Co., 2240 Broadway, New York, N. Y. (Importers.) "F. N."

PEUGEOT Freres, 296 Broadway, New York, N. Y. (Importers).

PHILLIPS & Hamilton, Bradford, Pa.

PIERCE Cycle Co., Buffalo, N. Y.

PROSPECT Motor Co., 1900 Broadway, New York, N. Y. "Simplex."

R.-S.—See Reading Standard Co.

READING Standard Co., Reading, Pa. "R.-S." (See page opposite.)

RELIANCE Motor Cycle Co., 444 Main St., Owego, N. Y.

ROYAL Motor Works, 38 Bloomingdale Rd., Worcester, Mass.

SHIRLEY, Amos, 935 Eighth Ave., New York, N. Y. Importer). "Styria."

SIMPLEX—See Prospect Motor Co.

STEFFEY Mfg. Co., 2941 Girard Ave., Philadelphia, Pa.

STYRIA—See Shirley, Amos.

THEIM Mfg. Co., 38th St. & University Ave., N. E., Minneapolis, Minn.

THOR—See Aurora Automatic Machinery Co.

TORPEDO—See Hornecker Motor Mfg. Co.

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YALE—See Consolidated Mfg. Co.

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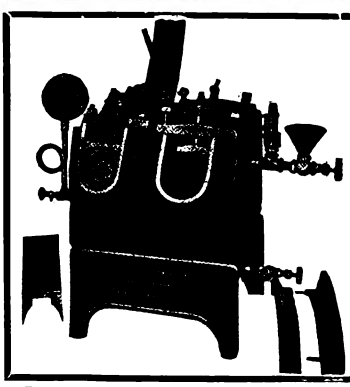

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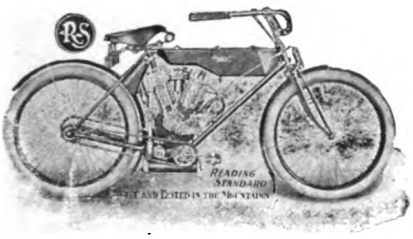

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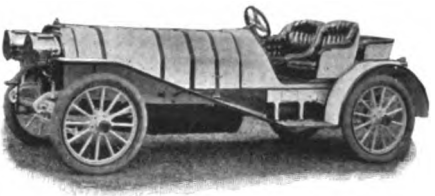

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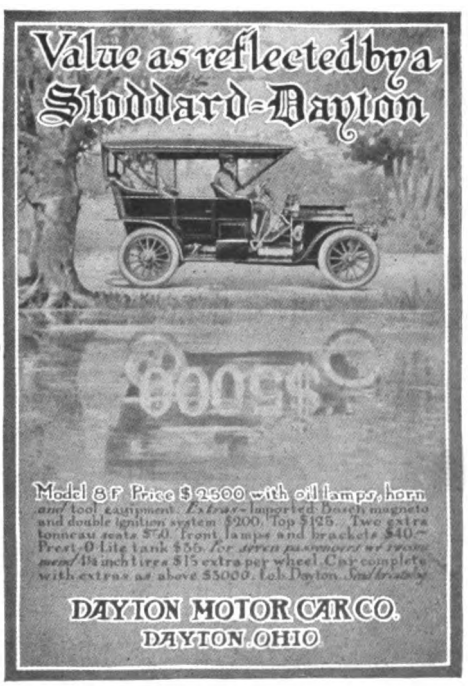

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PARTS AND ACCESSORIES

ACID

BATTERY ACID

(See Electrolyte, Battery)

SOLDERING ACID

(See Flux, Soldering)

ALARMS

BOILER ALARMS

(See Columns, Water)

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UNITED States Industrial Alcohol Co., 100 William St., New York, N. Y.

WEBB & Son, James A., 50-52 Stone St., New York, N. Y.

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SHEET AND ROD ALUMINUM

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ALUMINUM Co. of America, Pittsburg, Pa.

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DONGAN Instrument Co., Albany, N. Y.

EAGER Electric Co., Watertown, N. Y.

ELDREDGE Electric Mfg. Co., 7 Post Office Square, Springfield, Mass.

FORT Wayne Electric Works, Broadway & P. R. R., Fort Wayne, Ind. "Wood."

GENERAL Electric Co., Schenectady, N. Y.

INTERNATIONAL Electric Meter Co., Chicago, Ill.
(See page opposite.)

KEYSTONE Electrical Instrument Co., 9th St. & Montgomery Ave., Philadelphia, Pa.

NORTON Electrical Instrument Co., Manchester, Conn.

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

QUEEN & Co., Eighth & Arch Sts., Philadelphia, Pa.

RELIANCE Instrument Co., 60 W. Van Buren St., Chicago, Ill.

S. E. I. Co., Syracuse, N. Y.

TROY Electrical Co., Troy, N. Y.

TWIN—See Whitney Electrical Instrumen Co.

WAGNER Electrical Mfg. Co., 6400 Plymout Ave., St. Louis, Mo.

WESTERN Electric Co., 259 So. Clinton St Chicago.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

WESTON Electrical Instrument Co., Waverly Park, Newark, N. J.

WHITNEY Electrical Instrument Co., Concord, N. H. "Twin."

WOOD—See Fort Wayne Electric Works.

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AUTOMOBILE ANNUNCIATORS

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(See page 143.)

HICKS Speed Indicator Co., 1263 Atlantic Ave., Brooklyn, N. Y.

JONES Speedometer Co., New Rochelle, N. Y.

MADISON SQUARE—See Cowles & Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers).
(See page 179.)

SMITH & Son, S., 116 Broad St., New York, N. Y. (Importers.)

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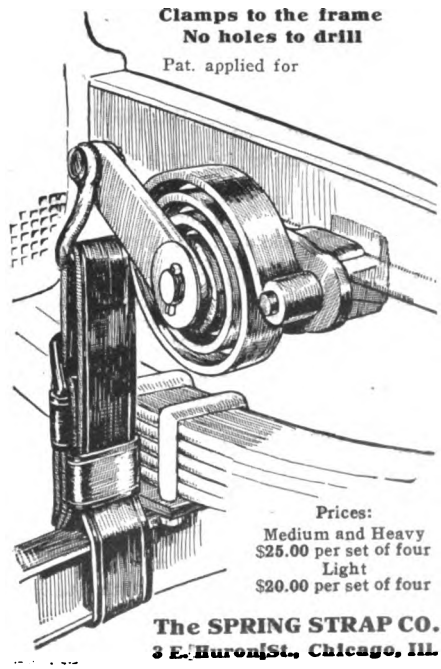

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JOHNS-MANVILLE Co., H. W., 100 William St., New York, N. Y.

KEASBY & Mattison Co., Ambler, Pa.

NEW Jersey Asbestos Co., Camden, N. J.

NEW York Asbestos Mfg. Co., 80 John St., New York, N. Y.

SALL Mountain Asbestos Mfg. Co., 68 S. Canal St., Chicago, Ill.

WATSON Co., H. F., Erie, Pa.

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(See page 37.)

AXLES

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AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, Ohio.
(See page opposite.)

AMERICAN Gear & Mfg. Co., 205 W. South St., Indianapolis, Ind.

CENTURY Specialty Co., 1079 S. Bruck St., Columbus, O.

CHICAGO Recording Scale Co., Waukegan, Ill. "Graham." (Anti-Skid.)

CLEVELAND Axle Mfg. Co., Canton, O.

COLUMBUS Screw & Machine Co., 244-46 Kaiser St., Columbus, O.

COVERT Motor Vehicle Co., Lockport, N. Y.

DALZELL Axle Co., So. Egremont, Mass.

DESCHLER, August, 18-20 E. Water St., Chillicothe, O.

DIAMOND Chain & Mfg. Co., 231 West Georgia St., Indianapolis, Ind.
(See page 85.)

DRAGON—See Sheldon Axle Co.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

ELWELL-PARKER Electric Co., 4225 St. Clair Ave., Cleveland, O.
(See page 19.)

ELYRIA Machine Parts Co., Elyria, O.

FUNK Engineering Co., 39-45 14th St., Hoboken, N. J.

GILL & Sons Forge & Machine Works, P. H., 1 Lorraine St., Brooklyn, N. Y.
(See page 319.)

GRAHAM—See Chicago Recording Scale Co.

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.) "Lemoine."
(See page 325.)

JACKSON Drop Forging Co., Jackson, Mich.

LAVALETTE & Co., 112-14 W. 42d St., New York, N. Y. (Importers). "M & B," "Lemoine."
(See page 479.)

LEE & Porter Mfg. Co., Buchanan, Mich.

LEMOINE—See International Engineering Co.

LEMOINE—See Lavalette & Co.

LEWIS Spring & Axle Co., Jackson, Mich.
(See page opposite.)

LINDSAY & Co., T. J., 415-19 Massachusetts Ave., Indianapolis, Ind.

LONG Arm System Co., Cleveland, O.
(See page 93.)

M & B—See Lavalette & Co.

McCUE Co., Hartford, Conn.
(See page 93.)

MERCHANT & Evans Co., Philadelphia, Pa.
(See page 327.)

MOTT Wheel Works, Pleasant St., Utica, N. Y.

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.
(See page 183.)

REESE Machine & Tool Works, S., 224 W. Main St., Plymouth, Pa.

ROSS Gear & Tool Co., Main & Ninth Sts., Lafayette, Ind.

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 407.)

SHELDON Axle Co., Wilkes-Barre, Pa. "Dragon."
(See page 229.)

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

STANDARD Roller Bearing Co., Philadelphia, Pa.
(See page 445.)

STOW Flexible Shaft Co., 26th & Callowhill St., Philadelphia, Pa.

TIMKEN Roller Bearing Axle Co., Canton, O.

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O.
(See page 189.)

WABASH Gear Works, 10th & Farrington Sts., Terre Haute, Ind.

WESTON-MOTT Co., Flint, Mich.
(See page 151.)

WIDE RANGE—See High Wheel Auto Parts Co.

BACKS

METAL SEAT BACKS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J.
(See page 109.)

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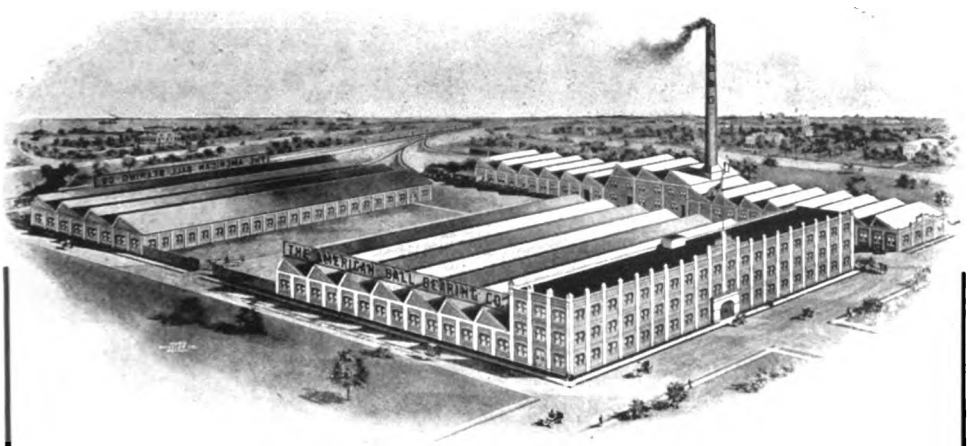

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OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.
(See page 147.)

BAGS

COAT RAIL BAGS

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. "Security."
(See page 63.)

NATHAN Novelty Mfg. Co., 84-90 Reade St., New York, N. Y.
(See page 227.)

SECURITY—See Imperial Brass Mfg. Co.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

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NATIONAL India Rubber Co., Bristol, R. I.

SEAMLESS Rubber Co., New Haven, Conn.

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(For Tool Boxes—See Boxes, Tool)

BLIZZARD—See Vehicle Apron & Hood Co.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

COOK & Bro., E. C., 49 E. Kinzie St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

HOLLIDAY-WYON Co., Indianapolis, Ind.
(See page 497.)

HOPEWELL Bros. & Co., 42 Osborne St., Cambridge, Mass.
(See page 223.)

HUMPHREYS, John, 4038 Payne Ave., N. E., Cleveland, O.

REPUBLIC Belting & Supply Co., 1616 W. Third St., Cleveland, O.

VEHICLE Apron & Hood Co., Columbus, O. "Blizzard."
(See page 135.)

WARNER Pole & Top Co., 1648 Central Ave., Cincinnati, O.

BALLS

STEEL BALLS

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, Ohio.
(See page 43.)

AMERICAN Ball Co., Eagle St. & Knisley Ave., Providence, R. I.

BRETZ Co., J. S., 410 Times Bldg., New York, N. Y. (Importers.)
(See page 173.)

BUFFALO Excelsior Machine Co., Military Road, Buffalo, N. Y.

NEW Departure Mfg. Co., Bristol, Conn.

STANDARD Roller Bearing Co., Philadelphia, Pa.
(See page 445.)

VICTOR Tool Co., Waynesboro, Pa.
(See page 349.)

BANDING

BRAKE BANDING OR LINING

(For Lining Brakes or Clutches. See also Leather, Friction; also Belting, Leather; also Fibre, Hard)

ATKINS Co., E. C., South & Illinois Sts., Indianapolis, Ind. "F.O.E."

CAMEL HAIR—See Rossendale-Redaway Co.

F.O.E.—See Atkins Co.

GANDY Belting Co., 728 W. Pratt St., Baltimore, Md.

GRIP-ON—See New York Leather Belting Co.

JOHNS-MANVILLE Co., H. W., 100 William St., New York, N. Y.

NEW YORK Leather Belting Co., 51 Beekman St., New York, N. Y. "Grip-on."
(See page 53.)

RAYBESTOS—See Royal Equipment Co.

ROSSENDALE-REDAWAY Belting & Hose Co., Euclid Ave., Newark, N. J. "Camel Hair."

ROYAL Equipment Co., 164 Housatonic Ave., Bridgeport, Conn. "Raybestos," "Stability."
(See page opposite.)

STABILITY—See Royal Equipment Co.

THERMOID—See Trenton Rubber Mfg. Co.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J. "Thermoid."
(See page opposite.)

BANDS

NON-SKID BANDS

(See also Treads, Detachable. For Tire Chains—See Chains, Tire)

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NON-SKID BANDS (Continued)

BROWN Mfg. & Garage Co., J. C., Butler, Ind. "Burke."

BURKE—See Brown Mfg. & Garage Co.

DAVEY Tire Guard Co., 399 Franklin St., Buffalo, N. Y.

GARAGE Equipment Co., Milwaukee, Wis. "Perfect Mud Hook."

HEALY Leather Tire Co., 90 Gold St., New York, N. Y.
(See page 441.)

KANT-SKID—See Leather Tire Goods Co.

LEATHER Tire Goods Co., Newton Upper Falls, Mass. "Woodworth," "Kant-Skid."
(See page 199.)

MATTSON Rubber Co., Lodi, N. J.
(See page 151.)

MESINGER Mfg. Co., H. & F., 1801 First Ave., New York, N. Y.

PERFECT MUD HOOK—See Garage Equipment Co.

PERFECTION Non-Skid Climber Co., Edon, O.
(See page 403.)

SUNBURY Mfg. Co., Sunbury, O.

UNIVERSAL Tire Protector Co., Angola, Ind.

WALLWORKS—See Wells Light Mfg. Co.

WELLS Light Mfg. Co., 44-46 Washington St., New York, N. Y. "Wallworks."

WOODWORTH—See Leather Tire Goods Co.

BASKETS

TOURING BASKETS

(See Hampers, Touring)

BATTERIES

DRY BATTERIES

ACME—See Nungesser Electric Battery Co.

ALPHA Dry Battery Co., 28 Cortlandt St., New York, N. Y.

AMERICAN Electrical Novelty & Mfg. Co., 308 Hudson St., New York, N. Y. "Ever Ready."

AUTOCRAT—See Stackpole Battery Co.

AUTOGAS—See Roche, Wm.

BLUE RIBBON—See Roche, Wm.

BUNNELL & Co., J. H., New York, N. Y. "Jove."

BURN-BOSTON Battery & Mfg. Co., 8 Doane St., Boston, Mass.

CHANDLER & Farquhar Co., 34-38 Federal St., Boston, Mass. "Federal."

COLUMBIA—See National Carbon Co.

DELTA Mfg. Co., Bloomfield, N. J.

DUNN—See Semi-Dry Battery Co.

EASTERN Carbon Works, W. Bergen St., Jersey City, N. J.

ELECTRIC Contract Co., 202 Centre St., N. Y. City.

ELK—See Stackpole Battery Co.

ELKHART Dry Battery & Signal Co., Commercial St., Elkhart, Ind.

EMPIRE State Dry Battery Co., 70 Fulton St., New York, N. Y. "Red Star." "White Star."

EVER READY—See American Electric Novelty & Mfg. Co.

FEDERAL—See Chandler & Farquhar Co.

FRENCH Battery Co., Madison, Wis.

GEEN Electrical Mfg. Co., 180 E. Lake St., Chicago, Ill. "Superior."

HI PO—See Lincoln Electric Co.

HI-UP—See Manhattan Electrical Supply Co.

HIRLIMANN, C. J., 17-19 Laight St., New York, N. Y. "Liberty." (Refilable.)
(See page 315.)

ILLINOIS Battery Co., 138 Exchange St., Freeport, Ill.

JOVE—See Bunnell & Co.

KIMBLE, Edgar J., 1931 Broadway, New York, N. Y.

LIBERTY—See Hirlimann, C. J.

LINCOLN Electric Co., 1-3 Union Sq., New York, N. Y. "Hi Po."

LUTZ-LOCKWOOD Mfg. Co., 39 Cortlandt St., New York, N. Y. "S-X."

MANHATTAN Electrical Supply Co., 17 Park Place, New York, N. Y. "Red Seal," "Hi-Up."

NATIONAL Carbon Co., Cleveland, O. "Red Top," "Columbia."
(See page 443.)

1900—See Nungesser Electric Battery Co.

NEW STANDARD—See Roche, Wm.

NUE—See Union Battery Co.

NUNGESSER Electric Battery Co., 21 King St., Cleveland, O. "Rapid Fire." "1900." "Acme."

RADIUM—See Stackpole Battery Co.

RAPID FIRE—See Nungesser Electric Battery Co.

RAYFLEX—See Standard Sheet Metal Co.

RED SEAL—See Manhattan Electrical Supply Co.

RED SHIELD—See Wesco Supply Co.

RED STAR—See Empire State Dry Battery Co.

RED TOP—See National Carbon Co.

ROCHE, Wm., 287 Clerk St., Jersey City, N. J. "Autogas." "Blue Ribbon." "New Standard."

ROCK Island Battery Co., Cincinnati, O.

SEMI-DRY Battery Co., 5th & Essex Sts., Harrison, N. J. "Dunn."
(See page 507.)

STACKPOLE Battery Co., St. Marys, Pa. "Autocrat." "Elk." "Radium." "Wizard."

STANDARD Sheet Metal Co., Delaware Ave., Passaic, N. J. "Rayflex."
(See page 213.)

SUPERIOR—See Geen Electrical Mfg. Co.

S-X—See Lutz-Lockwood Mfg. Co.

Complete Index to Classification appears on Pages 7 to 18.

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"Porox" Ignitor Storage Batteries

HIGH CAPACITY LIGHT WEIGHT

PROVED as the best for both ignition and light. No loss of current. It stores and returns the power to your machine. You can see and examine the interior without exposure and digging, because it is made up in transparent celluloid jars. No danger of breakage like hard rubber. Plates and jars are guaranteed for one year.

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BATTERIES (Continued)

DRY BATTERIES (Continued)

UNION Battery Co., Belleville, N. J. "Nue."
(See page opposite.)

VITA Mfg. Co., Los Angeles, Cal.

WESCO Supply Co., Seventh St. & Clark Ave., St. Louis, Mo. "Red Shield."

WESTCHESTER Appliance Co., Ludlow Station, Yonkers, N. Y.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WHITE STAR—See Empire State Dry Battery Co.

WIZARD—See Stackpole Battery Co.

STORAGE BATTERIES

(Including both Vehicle and Ignition Batteries)

ALVERN Battery Co., Evansville, Ind.

AMERICAN Battery Co., 170-72 South Clinton St., Chicago, Ill. "Invincible."

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page opposite.)

AUTEX—See Willard Storage Battery Co.,

BIJUR—See General Storage Battery Co.

CARPENTER & Volkhardt, 2441 Michigan Ave., Chicago, Ill. "Volkcar."

CHAMPION—See MacRae, Hector.

CHICAGO Battery Co., Wabash Ave. & 26th St., Chicago, Ill. "Duro."
(See page 47.)

CHLORIDE—See Electric Storage Battery Co.

CHURCHER Electric & Mfg. Co., 132 Opera Pl., Cincinnati, O.

COMBAT—See Commercial Battery Electric Co.

COMMERCIAL Battery Electric Co., 204-06 Michigan St., Chicago, Ill. "Combat."
(See page 449.)

COMMERCIAL Storage Battery Co., 147 W. Jackson Blvd., Chicago, Ill.

DAYTON Electrical Mfg. Co., 32 N. St. Clair St., Dayton, O. "Hubler-Dayton."

DAYTON Mfg. Co., 2240 E. Third St., Dayton, O. "Silvey."

DURO—See Chicago Battery Co.

EASTERN Battery Co., 42 Thurston St., Pawtucket, R. I.

EDISON Storage Battery Co., Orange, N. J.

ELECTRIC Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa. "Chloride." "Exide."

ELECTRIC Supply & Battery Co., 7510 Woodland Ave., S. E., Cleveland, O.

EMPIRE Battery Co., 153 W. 68th St., New York, N. Y.
(See pages 53 and 65.)

EXCELSIOR Storage Battery Co., 14 E. 116th St., New York, N. Y. "Marvel."
(See page 65.)

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill. "XLCR."
(See page 489.)

EXIDE—See Electric Storage Battery Co.

FEDERAL Mfg. Co., 194 Cushing St., Lowell, Mass. "Rex."

FIRE FLY—See Hoosier Storage Battery Co.

FOWLER Lamp & Mfg. Co., 2333-37 Wabash Ave., Chicago, Ill.
(See page 455.)

FRIAUF Accumulator Co., 420 Wabash Ave., Chicago, Ill.

GEISZLER Bros., 514-20 W. 57th St., New York, N. Y.
(See page 401.)

GENERAL Accumulator & Battery Co., 152 Second St., Milwaukee, Wis. "Radium."

GENERAL Storage Battery Co., Boonton, N. J. "Bijur." "High Duty."

GOSS Electric Co., 8765 Broadway, S. E., Cleveland, O.

GOULD Storage Battery Co., 241-47 Fifth Ave., New York, N. Y.

GREAT Central Electric Co., 271-73 Michigan Ave., Chicago, Ill. "Jewel."
(See page opposite.)

HAGEN—See Herz & Co.

HELIOS Mfg. Co., Bridesburg, Philadelphia, Pa.

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. (Importers.) "Hagen."
(See yellow insert.)

HIGH DUTY—See General Storage Battery Co.

HOOSIER Storage Battery Co., 212-16 E. Penn. St., Evansville, Ind. "Fire Fly."

HUBLER-DAYTON—See Dayton Electrical Mfg. Co.,

INVINCIBLE—See American Battery Co.

JEWEL—See Great Central Electric Co.

K. C.—See Kitsee Storage Battery Co.

KEELER Battery Co., 134 Ontario St., Toledo, O.

KITSEE Storage Battery Co., 628-29 Connell Bldg., Scranton, Pa. "K. C."
(See page opposite.)

MACRAE, Hector, 314 St. Paul St., Baltimore, Md. "Champion."

MARKO Storage Battery Co., 102-04 Jefferson Ave., Brooklyn, N. Y.
(See page 47.)

MARVEL—See Excelsior Storage Battery Co.

MICHIGAN Storage Battery Co., Detroit, Mich.
(See page 449.)

MILLER Storage Battery Co., 208-10 Michigan St., Toledo, O.

MORRISON—See Universal Electric Storage Battery Co.

MOUND City Battery Works, 916-24 N. 20th St., St. Louis, Mo.

MULLER, Albert, 145 W. 49th St., New York, N. Y. "Porox."
(See page 47.)

NATIONAL Battery Co., 268-82 Massachusetts Ave., Buffalo, N. Y.

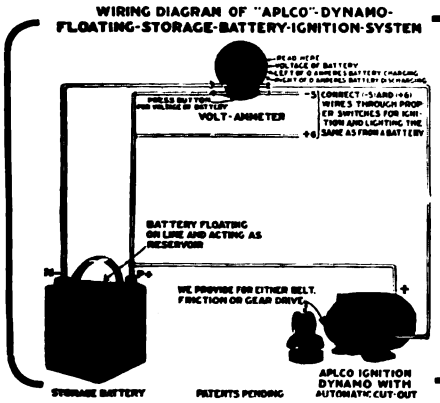
NEW England Battery Co., 295 Fountain St., Pawtucket, R. I.

NORTHWESTERN Storage Battery Co., Milwaukee, Wis.

OSWALD Co., C. J., 53-55 N. Market St., Grand Rapids, Mich.

PERFECTION Igniter Mfg. Co., 1093 Bedford Ave., Brooklyn, N. Y.

Complete Index to Classification appears on Pages 7 to 18.



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This cell embodies new principles and processes owned exclusively by this company.

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SOLE OWNERS AND MANUFACTURERS.

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BATTERIES (Continued)

STORAGE BATTERIES (Continued)

PHILADELPHIA Storage Battery Co., 3520 Emerald St., Philadelphia, Pa. (See page 449.)

POROX—See Muller, Albert.

PUMPELLY Battery Co., 1202-12 E. 22d St., Indianapolis, Ind.

RADIO Battery Co., 432 W. 42d St., New York, N. Y.

RADIUM—See General Accumulator & Battery Co.

RELIABLE—See Storage Battery Supply Co.

RELIANCE—See Storage Battery Supply Co.

REX—See Federal Mfg. Co.

ROYAL Battery Co., 108-10 Duane St., New York, N. Y.

RUMSEY Electric Co., 245 Jefferson Ave., Detroit, Mich.

SILVEY—See Dayton Mfg. Co.

STORAGE Battery Supply Co., 241 E. 27th St., New York, N. Y. "Reliance," "Reliable." (See page 473.)

SYRACUSE Auto Supply Co., 118-20 S. State St., Syracuse, N. Y.

TRAY Plate Battery Co., 5 Frederick St., Binghamton, N. Y.

UNITED States Battery Co., New Rochelle, N. Y.

UNIVERSAL Electric Storage Battery Co., 65 N. Peoria St., Chicago, Ill. "Morrison."

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

VIVAX Storage Battery Co., 2228 Michigan Ave., Chicago, Ill.

VOLKCAR—See Carpenter & Volkhardt.

WESTINGHOUSE Machine Co., Pittsburg, Pa.

WILLARD Storage Battery Co., Marquette & Lakeside Aves., Cleveland, O. "Autex."

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. (See page 205.)

XLCR—See Excelsior Supply Co.

ZOAR Battery Co., Zoar, O.

BEARINGS

BALL BEARINGS

For Bearing Parts—See Balls, Steel; also Cups, Ball; also Retainers, Ball)

AMERICAN Ball Co., Eagle St. & Knisley Ave., Providence, R. I.

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, Ohio. (See page 43.)

AUBURN Ball Bearing Co., 21-35 Elizabeth St., Rochester, N. Y.

B. K. F.—See Mercedes Motor Mfg. Co.

BANTAM Anti-Friction Co., Bantam, Conn.

BARTHEL & Daly, 42 Broadway, New York, N. Y. (Importers.) "Schafer." (See page opposite.)

BRETZ Co., J. S., 410 Times Bldg., New York, N. Y. (Importers). "F & S." (See page 173.)

CHAPMAN Double Ball Bearing Co., 40 Bristol St., Boston, Mass.

D. W. F.—See Hess-Bright Mfg. Co.

F & S—See Bretz Co.

GURNEY Ball Bearing Co., Jamestown, N. Y.

H-B—See Hess-Bright Mfg. Co.

HESS-BRIGHT Mfg. Co., 2101 Fairmont Ave., Philadelphia, Pa. "H-B," "D. W. F." (See page 445.)

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.) "R. B. F." (See page 325.)

LAVALETTE & Co., 112-14 W. 42d St., New York, N. Y. (Importers). "R. B. F." (See page 479.)

MERCEDES Motor Mfg. Co., New Kensington, Pa. (Importers.) "B. K. F." (See pages 298 and 413.)

NEW Departure Mfg. Co., Bristol, Conn.

R. B. F.—See International Engineering Co.

R. B. F.—See Lavalette & Co.

R. I. V. Co., 1771 Broadway, New York, N. Y.

SCHAFER—See Barthel & Daly.

SPARKS-WITHINGTON Co., Jackson, Mich. (See page 499.)

STANDARD Roller Bearing Co., Philadelphia, Pa. (See page 445.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

ROLLER BEARINGS

BOWER Roller Bearing Co., 427-29 Valley St., Dayton, O. (See page 389.)

GRANT—See Standard Roller Bearing Co.

HYATT Roller Bearing Co., Newark, N. J. (See page 133.)

SPARKS-WITHINGTON Co., Jackson, Mich. (See page 499.)

STANDARD Roller Bearing Co., Philadelphia, Pa. "Grant." (See page 445.)

TIMKEN Roller Bearing Axle Co., Canton, Ohio.

BELLS

ELECTRIC BELLS

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y. "Recti."

MANHATTAN Electrical Supply Co., 17 Park Place, New York, N. Y.

P. R. Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

RECTI—See Edwards & Co.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

MECHANICAL BELLS OR GONGS

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BEVIN Bros. Mfg. Co., East Hampton, Conn

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SILENT TYPE. 92% Balls.

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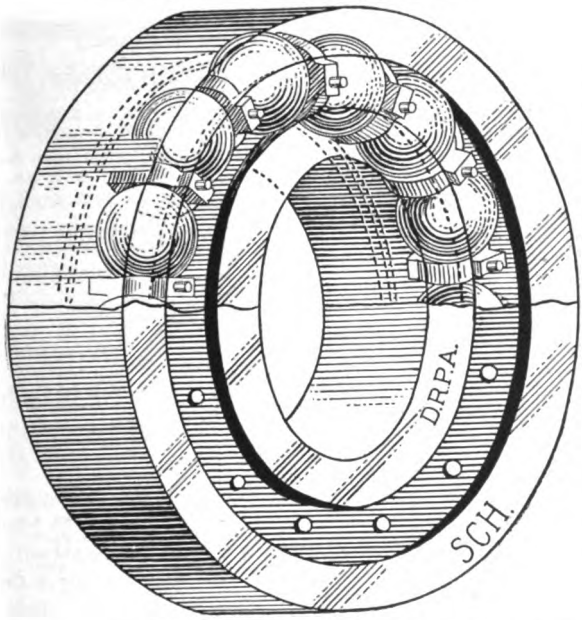

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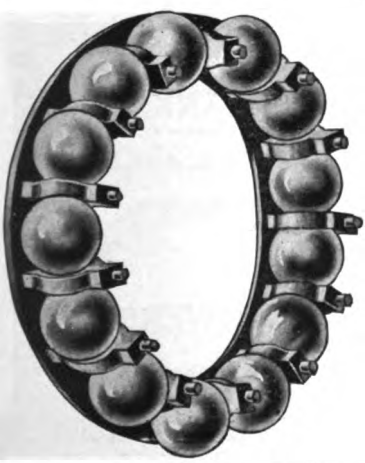
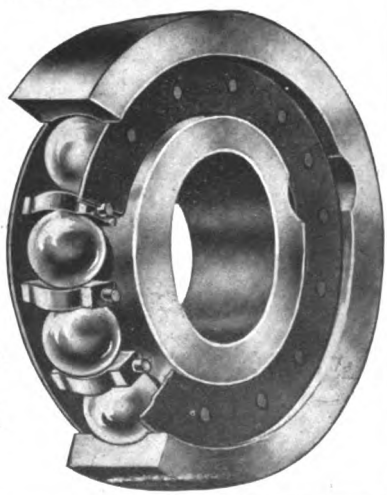


ALL Leading Foreign Cars use SCHAFER



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BELLS (Continued)

MECHANICAL BELLS OR GONGS (Continued)

BRIDGEPORT Brass Co., 253 Broadway, New York, N. Y. (See page 215.)

EAST Hampton Bell Co., East Hampton, Conn.

MOSSBERG Co., Frank, Attleboro, Mass.

NEW Departure Mfg. Co., Bristol, Conn.

BELTING

LEATHER BELTING

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass. (See page opposite.)

AMERICAN Oak Leather Co., Cincinnati, O.

AQUA—See Shultz Belting Co.

BRADFORD Belting Co., Second & Walnut Sts., Cincinnati, O.

CHICAGO Belting Co., 67 S. Canal St., Chicago, Ill.

CHICAGO Rawhide Mfg. Co., 75-77 Ohio St., Chicago, Ill. "Krome."

GRATON & Knight Mfg. Co., 94-104 Bloomingdale Rd., Worcester, Mass. (See page 271.)

HUDSON Belting Co., Worcester, Mass.

JEWELL Belting Co., 15 Trumbull St., Hartford, Conn.

KROME—See Chicago Rawhide Mfg. Co.

LADEW, Est. of Edward R., 200 William St., New York, N. Y.

NATIONAL Leather Belting Co., 29 Ferry St., New York, N. Y.

NEW YORK Leather Belting Co., 51 Beekman St., New York, N. Y. (See page opposite.)

PAGE Belting Co., Concord, N. H.

PROVIDENCE Belting Co., 25 Charles St., Providence, R. I.

RAHMAN & Co., Geo., 6 Ferry St., New York, N. Y.

REPUBLIC Belting & Supply Co., 1616 W. Third St., Cleveland, O.

SCHIEREN & Co., Chas. A., 30 Ferry St., New York, N. Y.

SHULTZ Belting Co., 402 Bartow St., St. Louis, Mo. "Aqua."

WILLIAMS & Sons, I. B., Dover, N. H.

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ENDLESS COTTON BELTS

(For driving Fans or Lubricators)

BROPHY Belting & Supply Co., La Grange, Ill.

SPIRAL WIRE BELTS

(For driving Fans or Lubricators)

ADWEAR Auto Tire Sleeve Co., High & Washington Sts., N. Attleboro, Mass.

BULL DOG—See New York Wire & Spring Co.

CALCUTTS—See Gardner Mfg. Co.

EMPIRE Battery Co., 123 W. 68th St., New York, N. Y. "Helix." (See page 65 and opposite.)

GARAGE Equipment Co., Milwaukee, Wis.

GARDNER Mfg. Co., 5637-39 Ohio St., Chicago, Ill. "Calcutts."

HEBB, Geo. A., 70 William St., Newark, N. J.

HELIX—See Empire Battery Co.

KELLEY, A. F., 178 S. Main St., Providence, R. I. "Kello."

KELLO—See Kelley, A. F.

LOMBARDI Motor Co., Derby, Conn.

McCORD & Co., Detroit, Mich. (See page 423.)

NATIONAL Flexible Tube Co., 320 Driggs Ave., Brooklyn, N. Y.

NEW York Wire & Spring Co., 71 Park Ave., Hoboken, N. J. "Bull Dog."

PHILADELPHIA Steel & Wire Co., 525 Commerce St., Philadelphia, Pa. "Powco."

POWCO—See Philadelphia Steel & Wire Co.

SCHOELKOPF Mfg. Co., 1516 Williamson St., Madison, Wis.

WEBB Mfg. Co., 60 Shipman St., Newark, N. J.

BENDINGS

WOOD BENDINGS

ACME Veneer Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page opposite.)

CARRIAGE Woodstock Co., Owensboro, Ky.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

SHEPARD & Sons, H. S., James & River Sts., New Haven, Conn.

TUCKER Wood Work Co., Sidney, O.

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

BLANKS

GEAR BLANKS

(See Gears, Blank)

BLOWERS

HORN BLOWERS

(Foot Bellows for blowing horns—for Electric Horn Blowers—See Horns, Electric)

KING DODO—See Vaugier Mfg. Co.

VAUGIER Mfg. Co., Wayne St. & P. R. R., Piqua, O. "King Dodo."

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AUTOMOBILE BRAKE BAND LINING

is superior to other types of lining because—

The reinforcement or cushion takes up all sudden jars and strains and permits the rivets, used to secure the lining to the band to be countersunk thus bringing the wear on the lining and not on the rivet-head.

Grip-On is sold under an absolute guarantee.

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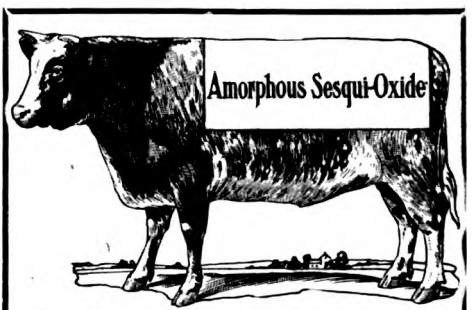
44 & 46 Franklin St., Chicago, Ill.



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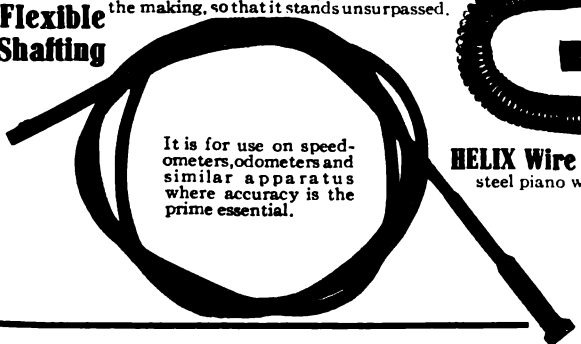

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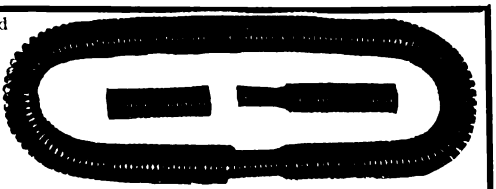

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METAL BODIES

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

AMESBURY Metal Body Co., Clark & Elm Sts., Amesbury, Mass.

ARMSTRONG & Co., M., 433 Chapel St., New Haven, Conn.

BARNDT-JOHNSTON Auto Supply Co., 408-26 Donaldson St., Columbus, O.
(See page 57.)

BIDDLE & Smart Co., Water St., Amesbury, Mass.

BRIDGEPORT Vehicle Co., South Ave. & Water St., Bridgeport, Conn.

COLE & Woop, 48 W. 67th St., New York, N. Y.

DETROIT Carriage Co., Clay St. & St. Aubin Ave., Detroit, Mich.

DETROIT Motor Car Supply Co., 1250 Jefferson Ave., Detroit, Mich.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See page 455.)

ILLINOIS Heater & Mfg. Co., 3947 Wentworth Ave., Chicago, Ill.

KEYSTONE Wagon Works, Reading, Pa.
(See page 59.)

KOEN, James R., 1257 Niagara St., Buffalo, N. Y.

LAWRENCE & Co., L., Newark, N. J.

LEITCH Co., James N., Amesbury, Mass.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MULLINS Co., W. H., 124 Franklin St., Salem, O.

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

PENNSYLVANIA Auto Metal Body Mfg. Co., Sinking Springs, Pa.

QUINBY & Co., J. M., 21-39 Division St., Newark, N. J.

READING Metal Body Co., Fleetwood, Pa.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.
(See page 147.)

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page opposite.)

WILSON Body Co., C. R., Milwaukee Jnc., Detroit, Mich.

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WOOD & Son, Frederick R., 217 W. 19th St., New York, N. Y.

WOOD BODIES

ABRESCH Co., Charles, Fourth & Poplar Sts., Milwaukee, Wis.
(See page 57.)

ARMSTRONG & Co., M., 433 Chapel St., New Haven, Conn.

AUTO Body Co., Lansing, Mich.
(See page 59.)

AUTO Top & Body Co., 249 N. Watts St., Philadelphia, Pa.

AUTO Top & Trimming Co., Pontiac, Mich.
(See page 275.)

BABCOCK Co., H. H., Watertown, N. Y.

BARNDT-JOHNSTON Auto Supply Co., 408-26 Donaldson St., Columbus, O.
(See page 57.)

BEAUDETTE Co., O. J., Pontiac, Mich.

BIDDLE & Smart Co., Water St., Amesbury, Mass.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLAKESLEE Vehicle Body & Seat Co., Kansas City, Mo.

BLUE Ribbon Auto & Carriage Co., 130-70 Cannon St., Bridgeport, Conn.

BORBEIN Auto Co., 2107 N. Ninth St., St. Louis, Mo.

BREWSTER & Co., Broadway & 47th St., New York, N. Y.

BRIDGEPORT Vehicle Co., South Ave. & Water St., Bridgeport, Conn.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROC Carriage & Wagon Co., E. 40th St. & Payne Ave., Cleveland, O.

BRUNN'S Carriage Manufactory, 1140-48 Main St., Buffalo, N. Y.

BUFFALO Auto Body & Trimming Co. 341 Ellicott St., Buffalo, N. Y.

BUOB & Scheu, 1408-10 Gilbert Ave., Cincinnati, O.
(See page 275.)

BURR & Co., 209 W. 48th St., New York, N. Y.

CARLISLE Body & Gear Co., North West & Lincoln Sts., Carlisle, Pa.

CARRIAGE Woodstock Co., Owensboro, Ky.

CENTRAL Mfg. Co., Connersville, Ind.

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill.
(See page 237.)

COLE & Woop, 48 W. 67th St., New York, N. Y.

COLLINS Vehicle Woodwork Co., R. N., 3906 Chateau Ave., St. Louis, Mo.

CURRIER-CAMERON Co., 85 Elm St., Amesbury, Mass.

CUTTER, J. Frank, 414 Main St., Cambridge, Mass.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DAYTON Folding Tonneau Co., 620 N. Geyer St., Dayton, O.

DENNISTON, E. E., 184 W. Mohawk St., Buffalo, N. Y.

DEMOREST & Co., A. T., New Haven, Conn.

DETROIT Carriage Co., Clay St. & St. Aubin Ave., Detroit, Mich.

DETROIT Motor Car Supply Co., 1250 Jefferson Ave., Detroit, Mich.

DUHAMEL & Sons, H., 127-37 Wallabout St., Brooklyn, N. Y.

DUNHAM & Son, D. B., 128 Irving St., Rahway, N. J.
(See page 299.)

FELLWOCK Automobile & Mfg. Co., 320 Upper Fourth St., Evansville, Ind.

FICKLING & Co., 154 E. 57th St., New York, N. Y.

FISHER, A., 302-10 Fort St., W., Detroit, Mich.

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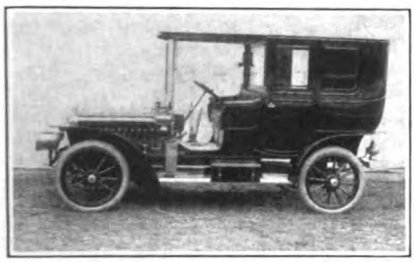
Limousine, Landaulette
Touring-Runabouts
In wood or aluminum



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FRANTZ Body Mfg. Co., Stanton Ave. & Getz St., Akron, O.
(See page 3.)

GOOLD Co., James, Albany, N. Y.

GRAVES & Congdon Co., Amesbury, Mass.
(See page 143.)

HEALY & Co., 1652 Broadway, New York, N. Y.

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HOLBROOK-SINGER Co., 509-15 W. 56th St., New York, N. Y.

HOLCKER-ELBERG Carriage & Rubber Co., 1420 McGee St., Kansas City, Mo.

HOLCOMB Co., 105 Goffe St., New Haven, Conn.

HOWARTH & Rogers, Amesbury, Mass.

HUME Carriage Co., 66-68 Stanhope St., Boston, Mass.

JENSEN, C., 49-51 W. 66th St., New York, N. Y.

JOHNSON Service Co., 149-53 Michigan St., Milwaukee, Wis.
(See page 257.)

JUDKINS & Sons Co., J. B., Merimac, Mass.
(See page 55.)

KARBACH Automobile & Vehicle Co., 13th & Howard Sts., Omaha, Neb.

KEYSTONE Wagon Works, Reading, Pa.
(See page 59.)

KILVINGTON, S. W., Wilmington, Del.

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill.
(See page 59.)

KING Spring Co., Buffalo, N. Y.

KOEN, James R., 1257 Niagara St., Buffalo, N. Y.

KUNDTZ, Theo., Winslow & Center Sts., Cleveland, O.

LANE, T. W., Amesbury, Mass.

LAPORTE Carriage Co., Laporte, Ind.
(See page 427.)

LEITCH Co., James N., Amesbury, Mass.

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

MANHATTAN Auto Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MILLER & Co., A. J., Bellefontaine, O.

MILLER Bros., Amesbury, Mass.
(See page 311.)

MONROE Body Co., Pontiac, Mich.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOUNT & Bros., J. W., Maple Ave. & White St., Red Bank, N. J.

NEW HAVEN Carriage Co., Water & Franklin Sts., New Haven, Conn.

NICHOLS & Co., D. P., 116-22 W. Brookline St., Boston, Mass.

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PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

PEASE & Sons, S. C., Main St., Merrimac, Mass.

PEEZ & Hoffmann, 51-53 Third St., Milwaukee, Wis.

PETZELT & Keyser, 24th & Locust Sts., Philadelphia, Pa.

POWITZKY & Collins Carriage Woodwork Co., St. Louis, Mo.

QUINBY & Co., J. M., 21-39 Division St., Newark, N. J.

QUINSLER & Co., 26-30 Cambria St., Boston, Mass.

RACINE Novelty Mfg. Co., 15th & Clark Sts., Racine, Wis.

RECH & Sons, Jacob, 8th St. & Girard Ave., Philadelphia, Pa.

RITTER Mfg. Co., 63 Amsterdam Ave., Detroit, Mich.

ROBBINS & Co., Irvin, Tenth & Canal Sts., Indianapolis, Ind.

ROGERS Son & Co., Wm. D., 13th & Cherry Sts., Philadelphia, Pa.

ROTHSCHILD & Co., 530 W. 27th St., New York, N. Y.

SAFETY Buggy Co., Lancaster, Pa.

SCHUBERT Bros. Gear Co., 42-44 Cedar St. Oneida, N. Y.

SCHURMEIER Wagon Co., 29 Western Ave. Minneapolis, Minn.

SEABROOK & Smith Carriage Co., 126 Park St., New Haven, Conn.

SHIELDS Carriage Co., 11 Carriage Ave. Amesbury, Mass.

SIDNEY Mfg. Co., Sidney, O.

STIVERS, R. M., 19 W. 62d St., New York

STONE & Sons, C., 167-77 Ogden Ave., Chicago, Ill.

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TERRE Haute Carriage & Body Co., 101 Wabash Ave., Terre Haute, Ind.

THOMPSON Co., E. J., 5917-19 Penn Ave., Pittsburg, Pa.

UNION City Body Co., Union City, Ind.
(See page opposite.)

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

WALDMAN, Geo., 86-88 W. Johnson St., Philadelphia, Pa.

WALKER Carriage Co., Merrimac, Mass.
(See page 55.)

WENGER Carriage Works, Paradise, Pa.

WILLOUGHBY Co., 86 Genesee St., Utica, N. Y.

WILSON Body Co., C. R., Milwaukee Jnc., Detroit, Mich.

WOGAMAN, J. Webster, Union City, Ind.

WOOD & Son, Frederick R., 217 W. 19th St., New York, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

YORK Wagon Gear Co., York, Pa.

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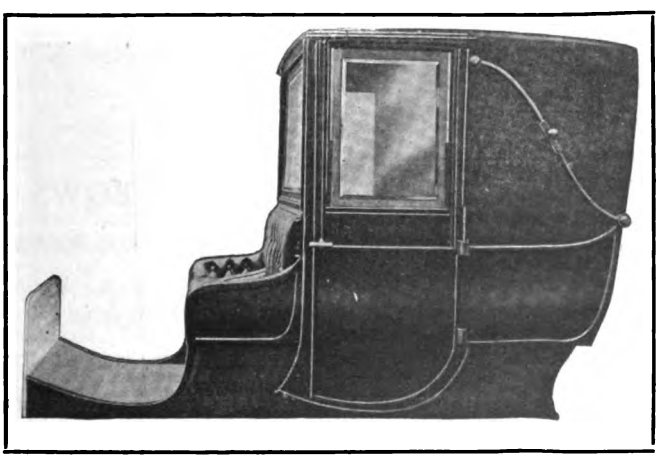

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(See page 285.)

STEAM Carriage Boiler Co., 130 First St., Oswego, N. Y.

STICKNEY—See Portland Garage Co.

WALKER Mfg. Co., E. C., 811 Nelson St., Louisville, Ky.

BOLTS

MACHINE BOLTS AND NUTS

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CHICAGO Screw Co., 519 Homan Ave., Chicago, Ill.

CLARK Bros. Bolt Co., Milldale, Conn.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corporation, New Britain, Conn.

DETROIT Screw Works, Detroit, Mich.
(See page 483.)

ELECTRIC Welding Products Co., Cleveland, O.
(See page 287.)

FERRY Cap & Set Screw Co., 2151 Scranton Road, Cleveland, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 481.)

KIRK-LATTY Mfg. Co., W. Madison Ave. & N. Y. C. Ry., Cleveland, O.

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PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., 751 Bellevue Ave., Detroit, Mich.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

REPUBLIC Iron & Steel Co., Frick Bldg. Annex, Pittsburg, Pa.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. LOUIS Screw Co., 3017 N. 13th St., St. Louis, Mo.

UNION Nut & Bolt Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 214 Foster Ave., Elyria, O.

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

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(See Pans, Dust)

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DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

EMPIRE Bending Works, Lancaster, Pa.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

SHEPARD & Sons, H. S., James & River Sts., New Haven, Conn.

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BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 109.)

DETROIT Auto Specialty Co., 910 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See page 455.)

KINSEY Mfg. Co., Dayton, O. "Kinwood." (See page 143.)

KINWOOD—See Kinsey Mfg. Co.

MULLINS Co., W. H., 124 Franklin St., Salem, O.

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

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JACKSON Mfg. Co., 614 17th St., Denver, Colo.

MAGNA Mfg. Co., R. W., Holyoke, Mass.

PATTERSON—See Stanley & Patterson.

RACINE Novelty Mfg. Co., 15th & Clark Sts., Racine, Wis.

RUTLAND Motor Specialty Co., 74 West St., Rutland, Vt.

STANLEY & Patterson, 23 Murray St., New York, N. Y. "Patterson."

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HOUSEHOLD Cabinet Co., Providence, R. I.

KUNDTZ, Theo., Winslow & Center Sts., Cleveland, O.

MARON, Frank A., 320-22 Pearl St., New York, N. Y. (See page 491.)

MURRAY, W. F., 28 Beach St., Boston, Mass.

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UNION Hardware Co., Torrington, Conn.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

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BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 109.)

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GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See page 455.)

KINSEY Mfg. Co., Dayton, O. "Kinwood." (See page 143.)

KINWOOD—See Kinsey Mfg. Co.

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LYON—See Imperial Brass Mfg. Co.

NEW YORK Auto Lamp Co., 585 Washington St., New York, N. Y.

NONPAREIL Brass Co., 143 Summer St., Providence, R. I.
(See page 391.)

NORTHWAY, Thomas J., Rochester, N. Y. "Rochester."
(See page 263.)

PATHFINDER—See Thompson & Govern.

ROCHESTER—See Northway, Thomas J.

THOMPSON & Govern, 418 W. 27th St., New York, N. Y. "Pathfinder."

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(See page 219.)

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CHICAGO Steel Foundry Co., Chicago, Ill.
(See pages 451 and 459.)

CROSBY Co., Buffalo, N. Y.
(See page 249.)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich.
(See page opposite.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago Ill.
(See page 507.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

STANDARD Brake Co., 101 W. 66th St., New York, N. Y.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page opposite.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 499.)

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J.
(See page 115.)

McCUE Co., Hartford, Conn.
(See page 93.)

NONPAREIL Brass Co., 143 Summer St., Providence, R. I.
(See page 391.)

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STANDARD Welding Co., Cleveland, O.
(See page 263.)

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(See page 407.)

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KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 499.)

LONG Arm System Co., Cleveland, O.
(See page 93.)

RAYMOND—See Royal Equipment Co.

ROYAL Equipment Co., 164 Housatonic Ave., Bridgeport, Conn. "Raymond."
(See page 45.)

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(See page 123.)

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(See page 215.)

BUFFALO Copper & Brass Rolling Mill, Buffalo, N. Y.

CHICAGO Brass Co., Kenosha, Wis.

COE Brass Mfg. Co., Torrington, Conn.

DETROIT Copper & Brass Rolling Mills, Detroit, Mich.

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HUSSEY & Co., C. G., 2850 Second Ave., Pittsburg, Pa.

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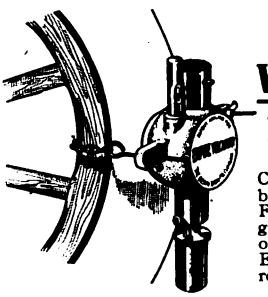

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BRASS (Continued)

SHEET AND ROD BRASS AND COPPER (Continued)

NEW Haven Copper Co., Seymour, Conn.

NEW Jersey Tube Co., Kingsland Ave., Harrison, N. J.

PLUME & Atwood Mfg. Co., Waterbury, Conn.

RANDOLPH - CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

SCOVILLE Mfg. Co., 99 Mill St., Waterbury, Conn.

SEYMOUR Mfg. Co., Seymour, Conn. (See page 393.)

TAUNTON-NEW BEDFORD Copper Co., Taunton, Mass.

WATERBURY Brass Co., 26 Crane St., Waterbury, Conn.

BRAZIERS

ALUMINUM BRAZIERS

GENERAL Welding Co., 423 Wabash Ave., Chicago, Ill. (See page 375.)

HARTMANN Co., 896 Eighth Ave., New York, N. Y. (See page 499.)

KOLLANSE Co., Geo. H., 776 Pacific St., Stamford, Conn. (See page 499.)

CAST IRON BRAZIERS

CAST Iron Brazing Co., Manchester, N. H.

GENERAL Welding Co., 423 Wabash Ave., Chicago, Ill. (See page 375.)

BROADCLOTH

UPHOLSTERY BROADCLOTH

(See also Trimmings, Cloth and Carpet)

COCHECO Woolen Mfg. Co., E. Rochester, N. H.

LAIDLAW, Jr., W. R., 244-50 W. 49th St., New York, N. Y. (See page 471.)

MADISON Woolen Co., Madison, Me.

SLATER & Sons Woolen Mill, Webster, Mass.

WATERLOO Woolen Co., Waterloo, N. Y.

BROOMS

STEEL WIRE BROOMS

(For cleaning garage floors)

AMERICAN Wire Brush Co., 277 Greenwich St., New York, N. Y. "Minerva."

DEAN & Co., Henry E., 180 Austin St., Worcester, Mass.

GALTON Mfg. Co., 5532 Perkins Court, N. E., Cleveland, O.

MINERVA—See American Wire Brush Co.

OSBORN Mfg. Co., Cleveland, O. (See page 305.)

BRUSHES

CARBON MOTOR BRUSHES

AMERICAN Carbon & Battery Co., East St. Louis, Ill.

EASTERN Carbon Works, W. Bergen St., Jersey City, N. J.

NATIONAL Carbon Co., Cleveland, O. (See page 443.)

SPEER Carbon Co., St. Marys, Pa.

SPARK PLUG BRUSHES

OSBORN Mfg. Co., Cleveland, O. (See page 305.)

PRESCO—See Pres Mfg. Co.

PRES Mfg. Co., 6008 Olive St., N. E., Cleveland, O. "Presco."

BUCKETS

COLLAPSIBLE BUCKETS

ABERCROMBIE & Fitch Co., 57 Reade St., New York, N. Y.

DUPLEX Folding Pail Co., 420 West 14th St., New York, N. Y.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

GORDON—See Vehicle Apron & Hood Co.

GUTTAPERCHA & Rubber Mfg. Co., 126 Duane St., New York, N. Y.

HODGMAN Rubber Co., 866 Broadway, New York, N. Y.

NATIONAL India Rubber Co., Bristol, R. I.

RUE Mfg. Co., 215 Race St., Philadelphia, Pa.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon." (See page 135.)

BUCKLES

STRAP BUCKLES

COWLES & Co., C., New Haven, Conn. (See page 143.)

METAL Stamping Co., 243-53 West St., New York, N. Y.

Complete Index to Classification appears on Pages 7 to 18.

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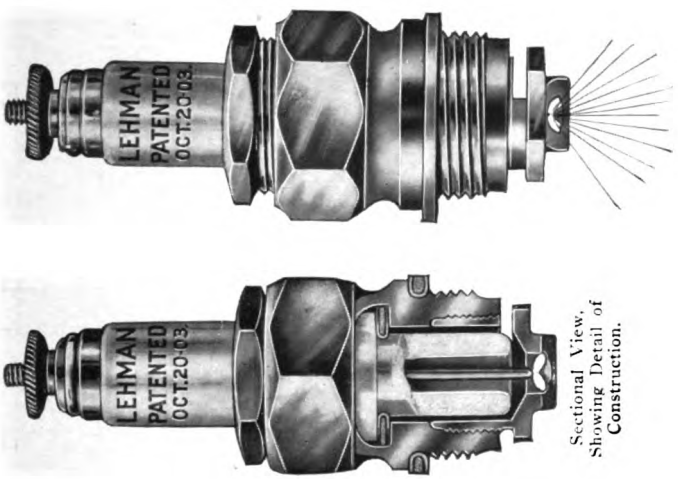

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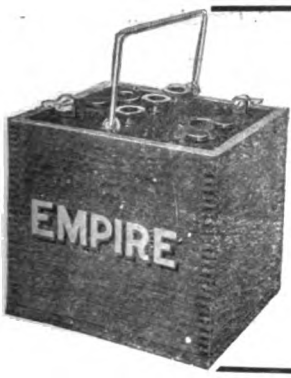

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BUCKLES (Continued)

STRAP BUCKLES (Continued)

NORTH & Judd Mfg. Co., New Britain, Conn.

SPENCER Wire Co., Worcester, Mass.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

TURN-BUCKLES

(See Turn-Buckles, Wrought)

BULBS

RUBBER HORN BULBS

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

HARTFORD Rubber Works Co., Hartford, Conn.

MECHANICAL Rubber Co., C. & P. R. R. near Nickel Plate R. R., Cleveland, O.

PARKER-STEARNS & Co., 228 South St., New York, N. Y.

SEAMLESS Rubber Co., New Haven, Conn.

BUMPERS

AUTOMOBILE BUMPERS

(For protecting lamps and radiators)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill. (See page 221.)

AMCO—See Appliance Mfg. Co.

APPLIANCE Mfg. Co., 60 W. Van Buren St., Chicago, Ill. "Amco."

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

GARAGE Equipment Co., Milwaukee, Wis. "Hercules."

HARROUN—See Turner Brass Works.

HERCULES—See Garage Equipment Co.

SAGER Co., J. H., 265 South Ave., Rochester, N. Y.

TURNER Brass Works, Sycamore, Ill. "Harroun."

VAN—See Vanderpool Bros.

VANDERPOOL Bros., 723 W. Mulberry St., Springfield, O. "Van."

Vanguard Mfg. Co., Joliet, Ill.

RUBBER SPRING BUMPERS

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

DIAMOND Rubber Co., Akron, O.

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O. (See page 199.)

HARTFORD Rubber Works Co., Hartford, Conn.

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

MECHANICAL Rubber Co., C. & P. R. R. near Nickel Plate R. R., Cleveland, O.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

WALPOLE Rubber Works, Walpole, Mass. (See page 177.)

BURNERS

ACETYLENE LAMP BURNERS

ALCO—See American Lava Co.

AMERICAN Lava Co., Chattanooga, Tenn. "Hela," "Alco." (See page opposite.)

BRAY ARMA—See Crane Co.

CARROLL, J. B., 90-92 Illinois St., Chicago, Ill.

CRANE Co., W. M., 1131-33 Broadway, New York, N. Y. "Bray Arma." (See page opposite.)

CRESCENT—See Kirchberger & Co.

DOLAN—See Steward Mfg. Co.

HELA—See American Lava Co.

KIRCHBERGER & Co., 339 Broadway, New York, N. Y. "Crescent." "Von Schwarz." (See page opposite.)

STEWARD Mfg. Co., D. M., Chattanooga, Tenn. "Dolan."

VON SCHWARZ—See Kirchberger & Co.

GASOLINE AND KEROSENE BURNERS

(For steam boilers)

BRANCH—See National Equipment Co.

FORG, Peter, Somerville, Mass. (See page 317.)

LIGHTNING—See Walker Mfg. Co.

KELLY Handle Bar Co., 5017 Perkins Ave., Cleveland, O.

NATIONAL—See Thompson Mfg. Co.

NATIONAL Equipment Co., Holland Bldg., St. Louis, Mo. "Branch."

OFELDT & Sons, August, 128 Liberty St., New York, N. Y.

OFELDT & Sons, F. W., Nyack-on-the-Hudson, N. Y.

STEAM Carriage Boiler Co., 130 First St., Oswego, N. Y.

THOMPSON Mfg. Co., Judson L., Waltham, Mass. "National."

WALKER Mfg. Co., E. C., 811 Nelson St., Louisville, Ky. "Lightning."

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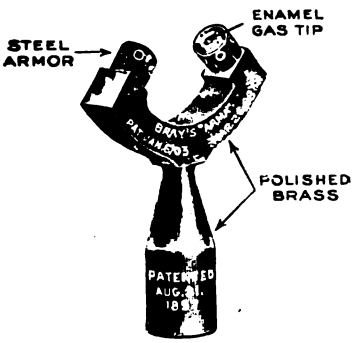

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Jarring won't affect it.
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25% MORE LIGHT

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We have in vain challenged this manufacturer to make good this assertion. Instead of accepting our challenge, he keeps on claiming. We now offer

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to anybody who will prove to us that we are in error when we pronounce this statement **TO BE UNTRUE** and contrary to facts, as far as they relate to the **VON SCHWARZ "Perfection" and CRESCENT "Victory" and "Imperial" Burners.**

Crescent "Victory"

The proof necessary to earn this reward will be a thorough testing of the commercial burners involved in this controversy, before disinterested authorities and scientists—one to be appointed by each party, and the two selected to appoint an umpire. We, on our part, agree to pay all expenses if anybody will succeed in making good the claim of our competitor.

If there is a burner that will produce more light than the VON SCHWARZ "Perfection" or CRESCENT "Victory" and "Imperial" Burners, it has not yet entered the markets of this country or the world at large, and until it does appear the VON SCHWARZ and CRESCENT will continue to be the **standard light giver.**

It is only justice to our neighbors to state that this challenge refers to the burner types of the **greatest efficiency,** *i.e.*—**NON-TURNDOWN Aero Burners**—as all burners with Turn-Down features (lava or metal arm) should be considered in a class by themselves. *They*, admittedly, give less light than other burners!

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ATLAS Tack Co., 113 Chambers St., New York, N. Y.

CINCINNATI Cloth Button Co., Cincinnati, Ohio.

COWLES & Co., C., New Haven, Conn. (See page 143.)

CRANDALL, Stone & Co., Binghamton, N. Y.

HIGGIN Mfg. Co., Newport, Ky.

JACKSON Cushion Spring Co., Jackson, Mich.

METAL Stamping Co., 243 West St., New York, N. Y.

NEW Haven Button Co., 161 Brewery St., New Haven, Conn.

READE, Chas. W., 103 Court St., New Haven, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. L.

WHITE Co, L. C., 214 Bank St., Waterbury, Conn.

CABLE

IGNITION CABLE

(See Wire, Insulated)

WIRE CABLE

(See Rope, Bronze Wire; also Rope, Steel Wire)

CAM-SHAFTS

FINISHED OR MACHINED CAM-SHAFTS

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 119.)

ELECTRIC Welding Products Co., Cleveland, O. (See page 287.)

MUSKEGON Motor Specialties Co., Muskegon, Mich. (See page opposite.)

VERSTRAETE-FYFE Mfg. Co., Burlington, Wis. (See page 59.)

CANOPIES

AUTOMOBILE CANOPIES

(See Tops, Automobile)

CANS

OILING CANS

(For Oil Guns—See Guns, Oil)

AKRON Mfg. Co., 927 High St., Akron, O.

ALUMINUM Mfg. Co., Two Rivers, Wis.

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn. (See page 225.)

BLOOMER, R. E., Keithsburg, Ill. "Cannon."

BROWN Oil Can Co., Dawson St., Toledo, O.

CANNON—See Bloomer, R. E.

CONSOLIDATED Fruit Jar Co., New Brunswick, N. J.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.

GEM Mfg. Co., Spruce near 33d St., Pittsburg, Pa.

HARVEY Mfg. Co., 19 Montrose St., Rochester, N. Y. "Oil Right."

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HERO Fruit Jar Co., Gaul & Adams Sts., Philadelphia, Pa.

HOWLAND—See Maple City Mfg. Co.

KNAPP Mfg. Co., 20 Warren St., New York, N. Y.

McCLINTOCK & Irvine Co., Neville St. & P. R. R., Pittsburg, Pa.

MAPLE City Mfg. Co., Monmouth, Ill. "Howland." (See page opposite.)

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

NOERA Mfg. Co., Griggs St., Waterbury, Conn.

OIL RIGHT—See Harvey Mfg. Co.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VOGEL & Bros., Wm., 37 S. Ninth St., Brooklyn, N. Y.

WILSON & Co., F. Cortez, 247 Lake St., Chicago, Ill.

WASTE CANS

(Receptacle for oily and dirty waste)

ATLANTIC Stamping Co., Rochester, N. Y.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 109.)

CENTRAL Stamping Co., 24 Cliff St., New York, N. Y.

CLARK Co., W. J., 161 Depot St., Salem, O.

CLEVELAND Wire Spring Co., Hamilton Ave. & E. 38th St., Cleveland, O. (See page 419.)

DELPHOS Mfg. Co., Delphos, O.

DURLACH, I., 54 Vesey St., New York, N. Y.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.

HILL Dryer Co., Worcester, Mass.

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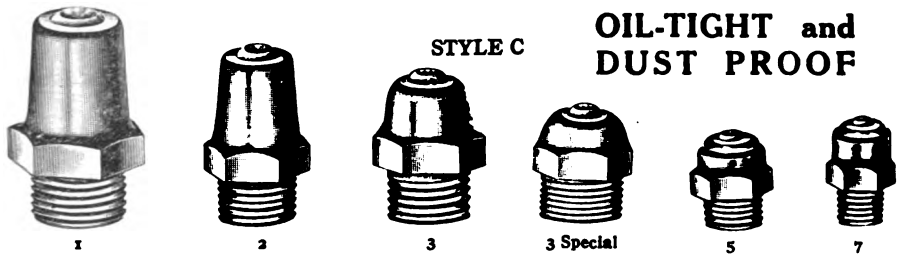

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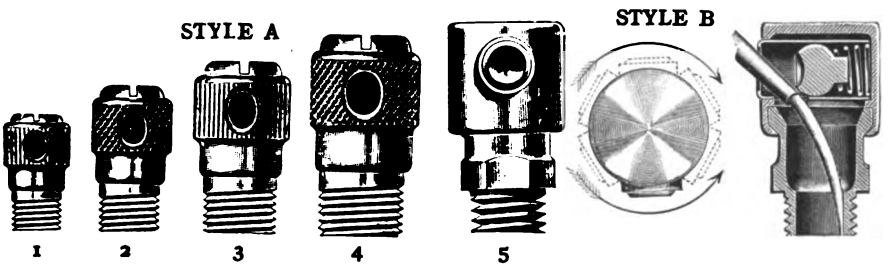

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LYON Metallic Mfg. Co., Aurora, Ill.

McCLINTOCK & Irvine, Neville St. & P. R. R., Pittsburg, Pa.

NACEFAS—See Wilson & Co.

NEW BRITAIN Machine Co., New Britain, Conn.
(See page 305.)

WILSON & Co., F. Cortez, 247 Lake St., Chicago, Ill. "Nacefas."

CAPS

HUB CAPS

(Pressed or Stamped Caps. For Cast Caps—See Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

BOWEN Mfg. Co., 16 Canal St., Auburn, N. Y.

CROSBY Co., Buffalo, N. Y.
(See page 249.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 481.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 499.)

STANDARD Welding Co., Cleveland, O.
(See page 263.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass.
(See page 339.)

MOTORISTS' CAPS

ADLER Bros., 127 W. 42d St., New York, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

DETROIT Cap Mfg. Co., 11-17 Woodbridge St., W., Detroit, Mich.

FORMAN & Co., Elie, 103 Bedford St., Boston, Mass.

FREEMAN-MAXFIELD Co., 210 E. Madison St., Chicago, Ill.

GORDON—See Vehicle Apron & Hood Co.

HENDRICKS Hat Co., A. P., 127-29 S. Meridian St., Indianapolis, Ind.

KAPLAN, Frank & Dunn, 56 E. 13th St., New York, N. Y.

KIBBE, C. S., Batavia, N. Y.

LASKY & Levy, 2 Astor Place, New York, N. Y.

MORAWETZ Co., 343 Broadway, Milwaukee, Wis.

PONTIAC Knitting Co., Pontiac, Mich.

REVILLON Freres, 19 W. 34th St., New York, N. Y.

SAKS & Co., Broadway & 33d St., New York, N. Y.

SCANDINAVIAN Fur & Leather Co., 16 W. 33d St., New York, N. Y.

SPEAR & Co., Woodhaven, N. Y.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt.

SPRINGFIELD Hat & Cap Co., 27-35 Taylor St., Springfield, Mass.

STALL & Dean Mfg. Co., 23 Foundry St., Brockton, Mass.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."
(See page 135.)

WANCKEL, Manfred, 640 Madison Ave., New York, N. Y.

RUBBER RADIATOR CAPS

STOKES Rubber Co., Jos., Trenton, N. J.

CARBIDE

CALCIUM CARBIDE

ACETYLENE Gas Illuminating Co., 405 Broome St., New York, N. Y. "Candy."

ACETYVONE Co., Niagara Falls, N. Y.

AMERICAN Carbolite Co., 301 N. 55th Ave., Duluth, Minn.

CANDY—See Acetylene Gas Illuminating Co.

NEW Amsterdam Motor Co., 152 W. 56th St., New York, N. Y.

UNION Carbide Co., Michigan Ave. & Adams St., Chicago, Ill.

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GASOLINE CARBURETERS

(For Mixing Valves or Vaporizers—See Vaporizers)

ABEL—See Fowler Brass Works.

ALCO—See Torrey, Wm. F.

ALLEN Fire Department Supply Co., Providence, R. I.

AMERICAN Carburetor & Improvement Co., 1660 Bushwick Ave., Brooklyn, N. Y. "Triple Action."
(See page 187.)

AMERICAN Carburetor Co., 29 Atwater St., Detroit, Mich.

AMERICAN Motor Co., Eau Claire, Wis. "Burdick."

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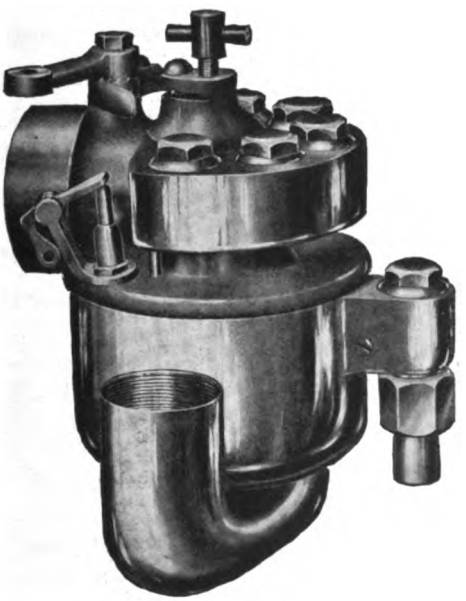

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CARBURETERS (Continued)

GASOLINE CARBURETERS (Continued)

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AUTO Improvement Co., 316 Hudson St., New York, N. Y. "Ever Ready."

B. G. & R.—See Mercedes Motor Mfg. Co.

BALL SPRAY—See Shain, Chas. D.

BECKLEY-RALSTON Co., 80-84 Michigan Ave., Chicago, Ill. "Maximus." (See page 267.)

BOWERS Co., F. E., New Haven, Conn. (See page opposite.)

BREEZE Carbureter Co., 276 Halsey St., Newark, N. J.

BROCK, A. A., 84-86 LaSalle St., Chicago, Ill.

BRODERICK Mfg. Co., E. N., 104 John R. St., Detroit, Mich. "E. C. B."

BROOKE—See Demster Machinery Co.

BROOKLYN Coil & Carbureter Co., 77-79 Adams St., Brooklyn, N. Y.

BUFFALO Carbureter Co., 887-89 Main St., Buffalo, N. Y.

BURDICK—See American Motor Co.

BYRNE, Kingston & Co., Kokomo, Ind. "Kingston." (See page 71.)

CAMDEN Anchor-Rockland Machine Co., Rockland, Me. "Knox."

CARTER-CHURCH Mfg. Co., 4148 Olive St., St. Louis, Mo.

CHRISTOPHER Bros., 1049 Sheffield Ave., Chicago, Ill. "Cyclone."

COWLES, E. P. H., 131-35 Belmont St., Warren, O.

CYCLONE—See Christopher Bros.

DALEY, Walter A., 647 W. Melrose Ave., Chicago, Ill.

DEMSTER Machinery Co., 16th & Walnut Sts., Kansas City, Mo. "Brooke."

DERRY Mfg. Co., Harrison Ave., Derry, N. H. (See page 503.)

DUPLEX Roller Bushing Co., Belfast, Me.

DURYEA, Chas E., Reading, Pa.

E. C. B.—See Broderick Mfg. Co., E. N.

EVER READY—See Auto Improvement Co.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. "Abel." (See page 451.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

G & A—See Myers, A. J.

GAITHER-OWEN Co., 40 W. 60th St., New York, N. Y.

GALVIN Brass Co., 74-78 Fort St., E. Detroit, Mich.

GAVELEK—See Lustre Chemical Co.

GENERATOR Valve Co., 294-96 Taaffe Place, Brooklyn, N. Y.

GREAT SCOTT—See Scott & Sons Co.

GRILLIER—See O'Brien & Co.

HAGAR Carburettor Co., 819-21 Broadway, Nashville, Tenn.

HALL Co., Chas. E., 108 Broadway, Buffalo, N. Y. (See page 353.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HEITGER Carbureter Co., 205-07 West South St., Indianapolis, Ind.

HENRICKS Novelty Co., 132 S. Capitol Ave., Indianapolis, Ind. "Stevenson."

HOLLEY Bros. Co., 661-73 Beaubein St., Detroit, Mich. (See page 187.)

K-W Ignition Co., 35 Power Ave., Cleveland, O. (See page 175.)

KALAMAZOO Carbureter Co., 1300 Grand Ave., Kalamazoo, Mich.

KAUFMAN, Chas., 28 Main St., Oshkosh, Wis.

KEMP, J. P., Baltimore, Md.

KENNEDY Ideal Carbureter Co., 170 Clarendon St., Boston, Mass. (See page 507.)

KINGSTON—See Byrne, Kingston & Co.

KNOX—See Camden Anchor-Rockland Machine Co.

KRAUSE, R. E., 8612 Wade Park Ave., Cleveland, O.

LOOMIS Autocar Co., Westfield, Mass.

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J. (See page 115.)

LUSTRE Chemical Co., 811 Woman's Temple Chicago, Ill. "Gavelek."

McCORD & Co., Detroit, Mich. (See page 423.)

MAXIMUS—See Beckley-Ralston Co.

MAYER Carbureter Co., 2673 Main St., Buffalo, N. Y.

MERCEDES Motor Mfg. Co., New Kensington, Pa. "B. G. & R." (See pages 298 and 413.)

MILLER, G. H., 1223 N. Eighth St., Quincy, Ill. "Anderson."

MYERS, A. J., 1610 Broadway, New York, N. Y. "G & A."

NIAGARA SPRAY—See Steinbrenner & Co.

NORTH Chicago Machine Co., North Chicago, Ill. "Palmbla." (See page 429.)

NUTTING Machine Co., Dayton, O. "Nu Zent."

NU ZENT—See Nutting Machine Co.

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y. (See page 41.)

O'BRIEN & Co., W. H., 115 Dearborn St., Chicago, Ill. "Grillier."

PALMBLA—See North Chicago Machine Co.

PETRE Carbureter Co., Cleveland, O. (See page 75.)

PIXLEY, Geo. A., 169 Huntington Ave., Boston, Mass.

RUTENBER—See Western Motor Co.

S. G. E.—See Standard Gas Engineering Co.

SCHEBLER—See Wheeler & Schebler.

SCIENTIFIC—See Stevens Co.

SCOTT & Sons Co., Fulton & Valley Sts., Medford, Mass. "Great Scott." (See page 337.)

Complete Index to Classification appears on Pages 7 to 18.

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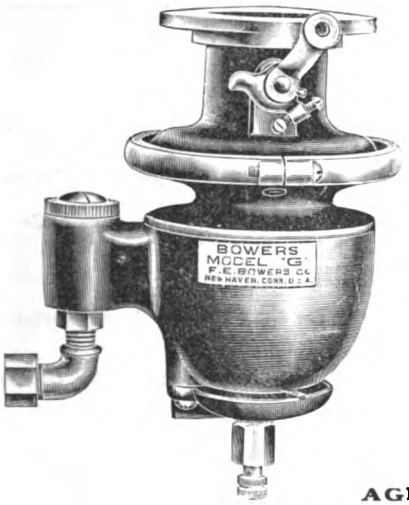


THE BOWERS CARBURETER

MODEL "G"

The Simplest Possible Carburetor, Having But One Adjustment

It does not require the constant attention of the driver while the car is in motion, but is efficient under all sorts of road conditions. This carbureter will make engine easy to start, it will show good power and speed and it is very flexible and economical. This carbureter is of the highest standard of manufacture and we will guarantee every part of it against imperfections for the period of one year.

We will furnish sample carbureters subject to trial and will refund cost price if the carbureter's action is not satisfactory in every way.

Manufactured in 1-inch, 1¼-inch, 1½-inch sizes, with either vertical or horizontal outlet and flange connection.

Price, 1-inch and 1¼-inch sizes.....$10.00
1½-inch size..... 12.00

AGENCIES

Boston, Percy Ford Co., The Bi-Motor Equipment Co.; Philadelphia, Pa., Geo. W. Nock Co., Chas. S. Smith & Co.; Albany, The Albany Iron & Hdwe. Co.; St. Louis, Behen-Faught Co.; Buffalo, Brunn's Carriage Mfy.; Detroit, Auto Equipment Co.; Chicago, Eugene Arnstein; St. Paul, C. J. Smith Co.; Portland, Ore., Ballou & Wright; Portland, Me., The James Bailey Co.; San Francisco, Hughson & Merton; Los Angeles, Hughson & Merton; Pittsburg, Kaufmann Bros.; Providence, Waite Auto Supply Co.; Springfield, The E. R. Clark Auto Co.; Chicago, Motor Car Supply Co., The Standard Auto Co.

New York Office, 1686 Broadway, A. H. Green, Mgr.
Chicago Office, 1436 Michigan Ave., F. E. Sparks, Mgr.
Eastern Sales Agents, White & Von Wettberg, Hartford, Conn.

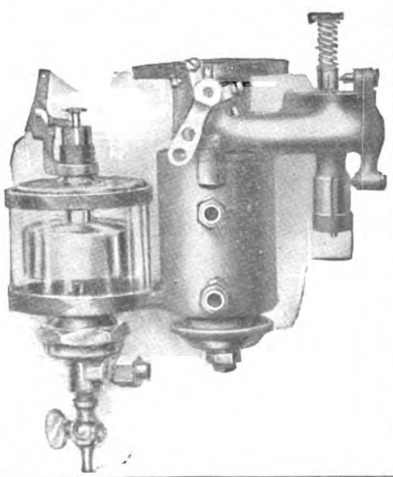
STROMBERG

CARBURETER

FORMERLY "THE GOLDBERG"

TRY ONE AT OUR EXPENSE

¶ Mechanically and scientifically correct.
¶ Greatly increased efficiency.
¶ Perfect mixture at any load or speed.
¶ Maximum power.
¶ Perfect throttle control.
¶ Much greater flexibility.
¶ Easy starting, summer or winter.



STROMBERG MOTOR DEVICES CO.

Successors Goldberg Motor Device Mfg. Co.

13th and Michigan Ave., Chicago, Ill.

Eastern Branch:
58th and Broadway,
New York, N. Y.

Western Branch:
222 Hansford Block,
San Francisco, Cal.

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CARBURETERS (Continued)

GASOLINE CARBURETERS

(Continued)

SHAIN, Chas. D., 70 Murray St., New York, N. Y. "Ball Spray."
(See page 265.)

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

SIRO Carburetor Mfg. Co., 27-35 Taylor St., Springfield, Mass.

SPEED Changing Pulley Co., Anderson, Ind. "Universal."
(See page 387.)

SPRAY Carbureter Co., 347 Franklin St., Buffalo, N. Y.

STANDARD Gas Engineering Co., 106 Main St., Bradford, Pa. "S. G. E."

STEINBRENNER & Co., 107 Victoria St., Buffalo, N. Y. "Niagara Spray."

STEVENS Co., E. W., E. New Market, Md. "Scientific."

STEVENSON—See Henricks Novelty Co.

STROMBERG Motor Devices Co., 13th & Michigan Ave., Chicago, Ill.
(See page 73.)

TORREY, Wm. F., 88 Broad St., Boston, Mass. "Alco."

TRIPLE Action—See American Carburetor & Improvement Co.

TURNER Brass Works, Sycamore, Ill.

UNIVERSAL—See Speed Changing Pulley Co.

WATT-DETROIT Carbureter Co., 66 Griswold St., Detroit, Mich.

WESTERN Motor Co., Logansport, Ind. "Rutenber."
(See page opposite.)

WHEELER & Schebler, Shelby & Sanders Sts., Indianapolis, Ind. "Schebler."

WILLET Engine & Carbureter Co., 704 Ellicott Sq., Buffalo, N. Y.
(See page 183.)

WILLIAMS Carbureter Mfg. Co., 963 William St., Buffalo, N. Y.

XARDELL Co., J. A. & C. A., Utica, N. Y.

CARPET

COACH CARPET

(See also Trimmings, Cloth and Carpet)

DOBSON, John & James, 26 N. Front St., Philadelphia, Pa.

SCHOFIELD, Mason & Co., Fairhill, Reese & Cumberland Sts., Philadelphia, Pa.

WESTBORO Mills, Westboro, Mass.

CASES

BATTERY CASES

(See Boxes, Battery)

CARD AND TOILET CASES

COWLES & Co., C., New Haven, Conn.
(See page 143.)

ENGLISH & Mersick Co., New Haven, Conn.

PARRY & Co., A. N., Amesbury, Mass.

PRATZNER, J. V., 61 Orange St., New Haven, Conn.

STRONG, M. H., 168 South Ave., Rochester, N. Y.
(See page 135.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

MEDICAL EMERGENCY CASES

ACCIDENT Cabinet Co., Kalamazoo, Mich.

BURROUGHS, Wellcome & Co., 45 Lafayette St., New York, N. Y. "Tabloid."

TABLOID—See Burroughs, Wellcome & Co.

UNITED States Emergency Case Co., Utica, N. Y.

SPARK COIL CASES

(See Boxes, Spark Coil)

SPARK PLUG CASES

(Leather case for holding spare plugs)

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

HOPEWELL Bros. & Co., 42 Osborne St., Cambridge, Mass.
(See page 223.)

HUMPHREYS, John, 4038 Payne Ave., N. E., Cleveland, O.

NATHAN Novelty Mfg. Co., 84-90 Reade St., New York, N. Y.
(See page 227.)

TIRE AND TUBE CASES

(For covering spare tires and tubes)

ALLEN Auto Specialty Co., 1931 Broadway, New York, N. Y.

BENNETT Suit Case Co., 46 Harrison Ave., Springfield, Mass.

BLIZZARD—See Vehicle Apron & Hood Co.

BURGIN Bros., Springfield, Mass. "Eureka."

EMPIRE Automobile Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

EUREKA—See Burgin Bros.

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

HOPEWELL Bros. & Co., 42 Osborne St., Cambridge, Mass.
(See page 223.)

HUMPHREYS, John, 4038 Payne Ave., N. E., Cleveland, O.

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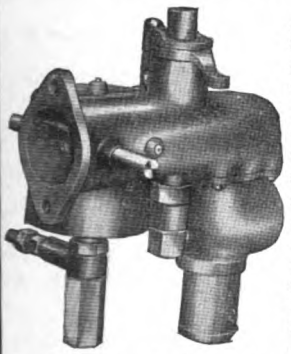
PETRE

CARBURETER



SO many Carbureters have been offered you that when something new and really good comes on the market you are skeptical of its claims. Now, don't let skepticism keep you from investigating this. It is something distinctly better than anything you ever used and will eliminate every carbureter trouble. **It Really Does It.** Write to us—write to-day (a postal will do), and let us send you full particulars.

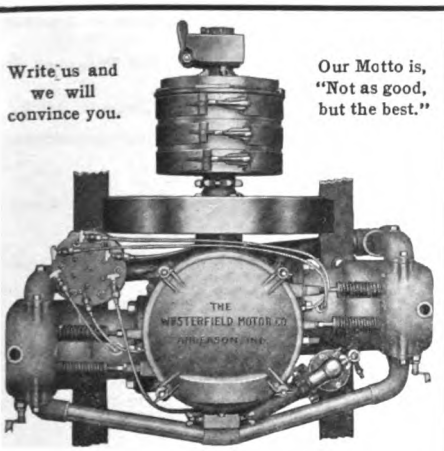
Liberal terms to agents—write

Petre Carbureter Co.

CLEVELAND, OHIO

Write us and we will convince you.

Our Motto is, "Not as good, but the best."



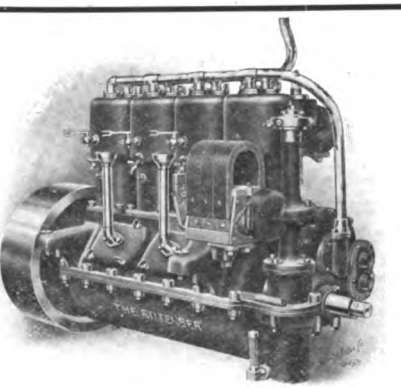
Westerfield Motor

1908 Models

Double opposed, water cooled, 16-18 H.P. and 22-24 H.P., planetary transmission for either chain or shaft drive; gear circulating pumps; force feed oilers.

WESTERFIELD MOTOR CO.,

Main and Big 4, Anderson, Ind.



RUTENBER 1909

25 to 50 H. P. MODELS

4-cylinder, 4 x 4
4-cylinder, 4½ x 5
4-cylinder, 4¾ x 5
4-cylinder, 5 x 5
6-cylinder, 4½ x 5

Fitted with oil pan base, and equipped for Magneto Attachment

Here is a Motor and Carburetor that can be depended upon for Automobile, Truck and Marine use.

They will prove the wisest and safest investment any manufacturer or dealer can make and will add 100 per cent. to the life, efficiency, running quality and reputation of the cars so equipped.

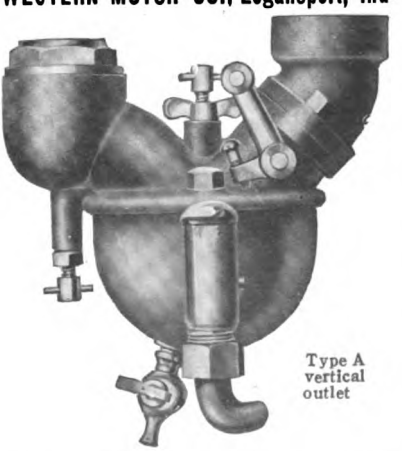
A Power Plant that will make any Car Absolutely Reliable under all Conditions.

Machines of the highest type, made in our own factory—one of the largest in the country—devoted exclusively to their manufacture. Prompt deliveries guaranteed.

We can prove every claim we make and urgently request every manufacturer, individual owner and dealer to write for information, which will be cheerfully furnished.

Write to-day

WESTERN MOTOR CO., Logansport, Ind.



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CASES (Continued)

TIRE AND TUBE CASES (Continued)

JENKINS Specialty Mfg. Co., 37 N. Main St., Sumter, S. C.

NATHAN Novelty Mfg. Co., 84-90 Reade St., New York, N. Y. (See page 227.)

PERFECT—See Wiley & Son Co.

RACINE Buggy Top Co., Racine, Wis.

VEHICLE Apron & Hood Co., Columbus, O. "Blizzard." (See page 135.)

VEHICLE Top & Supply Co., 900-06 Cass Ave., St. Louis, Mo. "Vesco." (See page 277.)

VESCO—See Vehicle Top & Supply Co.

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn. "Perfect."

WINSHIP, W. W., 71 Summer St., Boston, Mass.

TOOL CASES

(See Bags, Tool; also Boxes, Tool)

CASTINGS

ALUMINUM, BRONZE AND BRASS CASTINGS

ALLEN Fire Department Supply Co., Providence, R. I.

ALLYNE Brass Foundry Co., Cleveland, O., Detroit, Mich., & Buffalo, N. Y. (See page opposite title page.)

ALUMINUM Foundry Co., Manitowoc, Wis. (See page 451.)

AMERICAN Brass & Aluminum Works, Indianapolis, Ind.

AMERICAN Castings Co., 826 Columbus S. & T. Bldg., Columbus, O.

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

AMERICAN Manganese Bronze Co., 99 John St., New York, N. Y. (See page 177.)

AMERICAN Pin Co., Waterbury, Conn.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATLAS Brass Foundry Co., 991 Front St., Columbus, O.

AUTO Rail & Equipment Co., 113 Michigan Trust Bldg., Grand Rapids, Mich.

BADGER, F. L. (E. Concord) Concord, N. H.

BLAKE, Edwin J., 565 Windsor St., Hartford, Conn.

BELFIELD & Co., H., 435 N. Broad St., Philadelphia, Pa.

BRASS Foundry & Heating Co., 711-15 S. Adams St., Peoria, Ill.

BRIDGEPORT Deoxidized Bronze & Metal Co., Bridgeport, Conn.

BRIDGEPORT Foundry & Machine Co., Washburn & Carbon Sts., Bridgeport, Conn.

BUCKEYE Brass Foundry Co., 1807 Columbus Rd., Cleveland, O.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

BURLINGTON Brass Works, Burlington, Wis.

CADMAN Mfg. Co., A. W., Smallman & 28th Sts., Pittsburg, Pa.

CHAPMAN & Co., J. B., 51 Taylor St., Springfield, Mass.

CHICAGO Hardware Foundry Co., North Chicago, Ill.

CHICAGO Steel & Brass Works, 1706 Fisher Bldg., Chicago, Ill.

CITY Brass Foundry Co., Cleveland, O. (See page 363.)

CLARK, John W., Albany, N. Y.

CLUM & Atkinson, 563 Lyell Ave., Rochester, N. Y. (See page 365.)

COLONIAL Brass Co., New Haven, Conn.

COMSTOCK Brass Foundry Co., 2539 E. 79th St., Cleveland, O.

CRAIG, J. M., Arch St., Hartford, Conn.

CRAMP & Sons Ship & Engine Bldg. Co., Wm., Beach & Ball Sts., Philadelphia, Pa.

DELTA—See Phosphor Bronze Smelting Co.

DETROIT Motor Casting Co., 290-303 Beaufait Ave., Detroit, Mich.

DONOVAN Foundry Co., 249 R. R. Ave., Bridgeport, Conn.

ECLIPSE Foundry Co., Detroit, Mich. (See page 395.)

ELEPHANT—See Phosphor Bronze Smelting Co.

ELKHART Brass Mfg. Co., 908 Prospect St., Elkhart, Ind.

ENTERPRISE Foundry Co., Detroit, Mich.

ESSEX Brass Foundry Co., Amesbury, Mass. (See page 429.)

FAIRFIELD Aluminum Foundry Corp., Fairfield, Conn. (See page 79.)

FALLON Brass Foundry, S. Lawrence, Mass.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. (See page 507.)

FOREST City Brass Works, Cleveland, O.

FOSTORIA Aluminum Mfg. Co., Fostoria, O.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

FRIES & Co., 91 Main St., Buffalo, N. Y.

GALVIN Brass Co., 74-78 Fort St., E., Detroit, Mich.

GAYLORD Co., F. L., 28 Pleasant St., Ansonia, Conn.

GERSON-CAREY Co., Kalamazoo St. & L. S. Ry., Lansing, Mich.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HERCULES Float Works, 200 Franklin St., Springfield, Mass.

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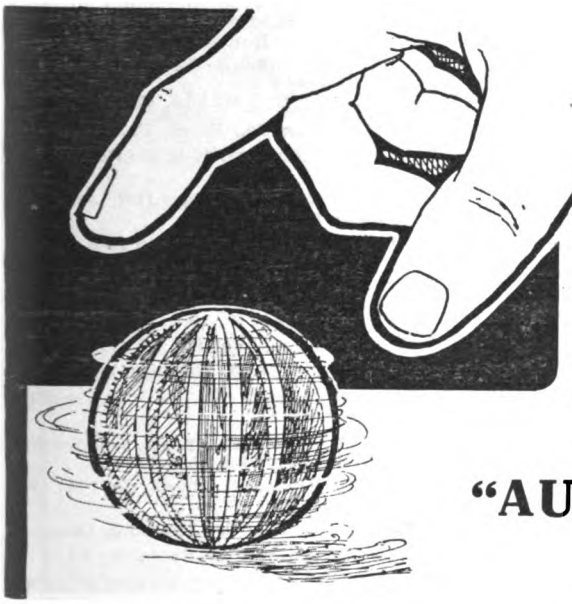


Buying castings without a reputation is like spinning a coin on results, a hit or miss proposition—"heads, he wins—tails you lose." You can't see the quality of material and casting with the eye, so you don't know what you've got until you test them.

"AUTOMOBILE" BRAND

Aluminum Castings

need small comment as far as reputation for quality, service, dependability and economy goes.

These castings are used by the leading and largest automobile makers because of their

HIGH GRADE QUALITY LIGHTNESS AND STRENGTH

giving maximum strength with minimum weight, and in every way meeting the most exacting requirements.

Especial adaption to automobile construction.

If you want to make sure of the Best send us your pattern for a sample.

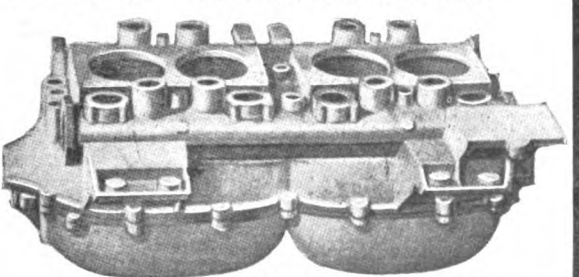
WE ALSO MAKE

"AUTOMOBILE" Brand PLASTIC BRONZE and MANGANESE CASTINGS

UP TO DATE—UP TO THE MINUTE. LET US SUBMIT SAMPLES.

Light Mfg. & Foundry Co.

Pottstown, Pa.



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CASTINGS (Continued)

ALUMINUM, BRONZE AND BRASS CASTINGS (Continued)

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

IDEAL Bronze Co., 1253 E. 55th St. Cleveland, O.

IMPERIAL BRASS Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

INDIANA Brass & Bronze Co., Marion, Ind.

JEFFERSON Brass Foundry, Brooklyn, N. Y.

JONAH & George, Merrimac, Mass.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

KEYSTONE Brass Foundry Co., 188 Berks St., Philadelphia, Pa.

KOKOMO Brass Works, 351 N. Smith St., Kokomo, Ind.

LANGSENKAMP-WHEELER Brass Works, 1206-28 Shelby St., Indianapolis, Ind.

LEVETT Co., Walker M., 464 Tenth Ave., New York, N. Y.
(See page 395.)

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 77.)

LUMEN Bearing Co., Lathrop St., Buffalo, N. Y.

McADAMITE—See United States McAdamite Metal Co.

McCORD & Co., Detroit, Mich.
(See page 423.)

MAYO Damper Co., 355 Walnut St., Pottstown, Pa.

MENSCHING Brass Foundry Co., 279 Park St., Milwaukee, Wis.

MICHIGAN Aluminum Foundry Co., 14 Post St., Detroit, Mich.

MILLETT Brass Co., Waltham Ave., Springfield, Mass.

MILWAUKEE Bronze Casting Co., 119 Clinton St., Milwaukee, Wis.

NEW JERSEY Aluminum Co., 701 Springfield Ave., Newark, N. J.

NEW Process Steel Co., 210 W. River St., Marshall, Mich.
(See page 253.)

NOLTE Brass Co., 21-29 W. Jefferson St., Springfield, O.

NON-CORROSIVE Metal Co., Watertown, Mass.
(See page 233.)

NONPAREIL Brass Co., 143 Summer St., Providence, R. I.
(See page 391.)

NORTHERN Indiana Brass Co., Elkhart, Ind.

NORWALK Brass Co., Mechanic St., Norwalk, Conn.

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y.
(See page 41.)

OHIO Brass Co., Mansfield, O.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant," "Delta."
(See page 453.)

PIONEER Brass Works, 424 S. Penn St., Indianapolis, Ind.

PITTSBURG Brass Mfg. Co., 32d St. & Penn Ave., Pittsburg, Pa.

PROVIDENCE Brass & Aluminum Foundry Co., 460 Eddy St., Providence, R. I.

RACINE Brass & Iron Co., Racine, Wis.

REEVES & Son, Paul S., 1415 Catherine St., Philadelphia, Pa.

ROSTAND Mfg. Co., Milford, Conn.

SAYRE Stamping Co., Sayre, Pa.

SCIOTO Brass Foundry, 10 S. Scioto St., Columbus, O.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

SILVERITE Metal Co., 25-27 Fulton St., Brooklyn, N. Y.
(See page 505.)

SMITH & Wallace, Woburn, Mass.

SPENCER'S Sons, I. S., Guilford, Conn.

SPRINGFIELD Brass Co., 126 S. Livingston St., Springfield, O.

STANDARD Brass Foundry Co., 6608 Central Ave., S. E., Cleveland, O.

STANDARD Bronze & Brass Co., 187 W. Broad St., Columbus, O.

STANDARD Foundry Co., Hartford, Conn.

STOVER Engine Works, Freeport, Ill.

STROMBERG-CARLSON Telephone Mfg. Co., Rochester, N. Y.

SYRACUSE Aluminum & Bronze Co., 530 Leavenworth Ave., Syracuse, N. Y.
(See front cover.)

THIERY & Kendrick Mfg. Co., 960-62 Champlain St., Detroit, Mich.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER Brass Works, Sycamore, Ill.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UNIQUE Brass Foundry Co., 25 Illinois St., Buffalo, N. Y.

UNITED States Aluminum Co., Pittsburg, Pa.

UNITED States Aluminum Castings Co., 1623 Bluerock St., Cincinnati, O.

UNITED States Bronze Co., 1831 Columbus Road, Cleveland, O.

UNITED States McAdamite Metal Co., 18-28 Rapelye St., Brooklyn, N. Y. "McAdamite."

VICTOR Metals Co., E. Braintree, Mass.

WAGNER Mfg. Co., Sidney, O.

WATERBURY Mfg. Co., Waterbury, Conn.

WESTERN Brass Mfg. Works, 1125 W. 21st St., Chicago, Ill.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

WILLIAMS & Son, E. A., 107 Plymouth St., Jersey City, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.
(See page 141.)

DIE CASTINGS

AMERICAN Die Casting Co., Vandalia Tracks & White River, Indianapolis, Ind.
(See page 395.)

BERRY & Parker, Erie, Pa.

BLISS Co., E. W., Brooklyn, N. Y.

FRANKLIN Mfg. Co., H. H., 400 S. Geddes St., Syracuse, N. Y.

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THE FAIRFIELD ALUMINUM FOUNDRY CORPORATION

FAIRFIELD, CONN.

(Bridgeport Suburb)

Originators and sole manufacturers of the famous LION Brand Aluminum Castings of surpassing quality, guaranteeing the highest tensile strength attainable for automobile, motor boat and Government work, or other severe requirements.

We are exclusively in the business of aluminum castings.

We make nothing else and claim to be experts in the trade. Our large and rapidly increasing business is due to the extra quality of our goods and minute attention to all its details.

We are furnishing many of the largest motor car manufacturers in the country and have never lost a customer.

Comparison invited.

Correspondence solicited.

THE FAIRFIELD ALUMINUM FOUNDRY CORP.

FAIRFIELD, CONN.

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CASTINGS (Continued)

DIE CASTINGS (Continued)

LUMEN Bearing Co., Lathrop St., Buffalo, N. Y.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 217.)

VAN WAGNER Mfg. Co., E. B., Syracuse, N. Y.
(See page 453.)

WETHERILL Finished Castings Co., Erie Ave. & Richmond St., Philadelphia, Pa.
(See page opposite.)

GRAY IRON CASTINGS

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

ARNOLD Co., Norwalk, Conn.

BARCUS & Co., Geo., Wabash, Ind.

BARLOW Foundry Co., 28 Orange St., Newark, N. J.

BELLE CITY Mfg. Co., Racine Junction, Wis.

BRIDGEPORT Malleable Iron Co., 719 South Ave., Bridgeport, Conn.

CAPITOL Foundry Co., Hartford, Conn.

CHICAGO Hardware Foundry Co., North Chicago, Ill.

CRAMP & Sons' Ship & Engine Building Co., Wm., Beach & Ball Sts., Philadelphia, Pa.

DEMOREST Mfg. Co., Williamsport, Pa.

DETROIT Stoker & Foundry Co., No. Grand Blvd. & Riopelle St., Detroit, Mich.

DOMESTIC Sewing Machine Co., Warren & High Sts., Newark, N. J.

DUPLEX Roller Bushing Co., Belfast, Me.

ELEVATOR Supply & Repair Co., 122 S. Jefferson Ave., Chicago, Ill.

ENTERPRISE Foundry Co., Detroit, Mich.

ERIE Foundry Co., 1200 W. 12th St., Erie, Pa.

FEARON & Loacker Foundry Co., 61-63 Townsend St., Chicago, Ill.

FERRO Machine & Foundry Co., 251 Wade Building, Cleveland, O.

FLATHER Foundry Co., Nashua, N. H.

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

GREY Iron Castings Co., Mt. Joy, Pa.

HART Foundry Co., 10 Allen St., Lawrence, Mass.

HAYES Foundry Co., Lynn, Mass.

HEARST Foundry & Mfg. Co., 801-05 S. Washington St., Peoria, Ill.

HILDRETH Mfg. Co., 703 Sheridan St., Lansing, Mich.

HOPSON & Chapin Mfg. Co., New London, Conn.

INDIANAPOLIS Foundry Co., 131 Harding St., Indianapolis, Ind.

INTER-STATE Foundry Co., 61st & Sheridan Sts., Cleveland, O.

KING & Andrews Co., 1st National Bank Bldg., Chicago, Ill.

LOVEWELL-HENRICI Co., 928 Broadway, Chelsea, Mass.

MANUFACTURERS Foundry Co., Waterbury, Conn.
(See page opposite 512.)

MARION Foundry & Machine Works, Marion, Ind.

MASSEY Machine Co., Watertown, N. Y.

MEEKER Foundry Co., 95 Clay St., Newark N. J.

MICHIGAN Motor Castings Co., Detroit, Mich.
(See page 83.)

MILLER & Jones Co., Wilmington, Del.

MILLETT Brass Co., Waltham Ave., Springfield, Mass.

NATIONAL Motor Castings Co., 224-28 Military Ave., Detroit, Mich.

NORTMANN-DUCKE Foundry Co., 26th & Layton Aves., Milwaukee, Wis.

PACIFIC Iron Works, 113 E. Washington St., Bridgeport, Conn.

PALMER & De Mooy Foundry Co., Leonard & Winter Sts., Cleveland, O.

PEQUONOCK Foundry, Bridgeport, Conn.

PHILADELPHIA Stove & Iron Foundry Co., 1631 N. Fifth St., Philadelphia, Pa.

RACINE Brass & Iron Co., Racine, Wis.

REEDY Foundry Co., 46th Ave. & Iowa St., Chicago, Ill.

RELIANCE Iron & Engine Co., West & Geneva Sts., Racine, Wis.

SESSIONS Foundry Co., Farmington Ave., Bristol, Conn.

SPENCER'S Sons, I. S., Guilford, Conn.

STANDARD Foundry & Mfg. Co., 2717 E 75th St., Cleveland, O.

STOVER Engine Works, Freeport, Ill.

STOWELL Mfg. & Foundry Co., So. Milwaukee, Wis.

SUSQUEHANNA Casting Co., Wrightsville, Pa.

TARRANT Foundry Co., 36-66 Indiana St., Chicago, Ill.

THREE Rivers Furnace & Foundry Co., Three Rivers, Mich.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UTICA Foundry Co., Utica, N. Y.

WAGNER Mfg. Co., Sidney, O.

WALKER Foundry Co., Erie, Pa.
(See page 83.)

WATERBURY Castings Co., R. R. Hill, Waterbury, Conn.

WESTERN Foundry Co., 3634 S. Kedzie Ave., Chicago, Ill.

WESTERN Malleable Steel Co., 1250 River St., Detroit, Mich.

WILCOX, Crittenden & Co., 88 Main St., Middletown, Conn.

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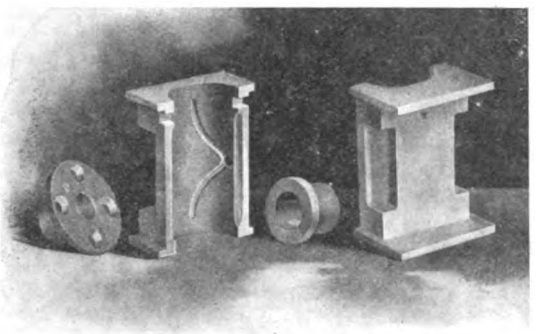
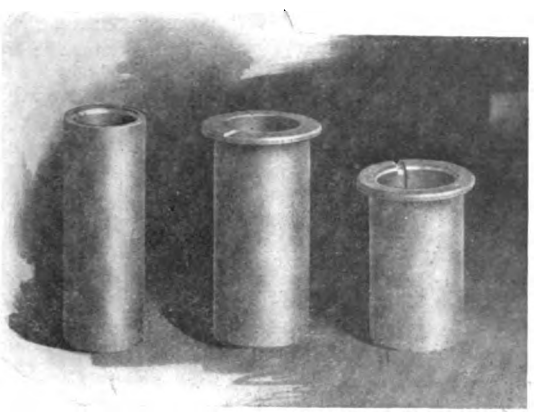
Gas Engine Bearings

The Wetherill system of die casting eliminates all possibility of porosity—our castings require no finishing—they are 100% perfect



Genuine Parsons White Brass Die Cast

We cast oil holes, oil grooves and dowels, we guarantee all castings accurate to .001" whenever such exactness is essential



Please Mail us Blue Prints for Estimates

Wetherill Finished Castings Co.

Philadelphia, Pa.

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CASTINGS (Continued)

MALLEABLE IRON CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Road, Buffalo, N. Y.

ALBION Malleable Casting Co., Albion, Mich.

BARLOW Foundry Co., 28 Orange St., Newark, N. J.

BEAVER Dam Malleable Iron Co., Beaver Dam, Wis.

BRIDGEPORT Malleable Iron Co., 719 South Ave., Bridgeport, Conn.

BUHL Malleable Iron Co., Detroit, Mich.

CHISHOLM & Moore Mfg. Co., Lakeside Ave. & E. 49th St., Cleveland, O.

COLUMBUS Malleable Iron Co., 770 Jefferson Pl., Columbus, O.

DAYTON Malleable Iron Co., Dayton, O.

ERIE Malleable Iron Co., Erie, Pa.

FLAGG & Co., Stanley G., Philadelphia, Pa.

FRAZER & Jones Co., Syracuse, N. Y.

GLOBE Malleable Iron Co., Greenway Ave., Syracuse, N. Y.

ILLINOIS Malleable Iron Co., 535 Diversly Blvd., Chicago, Ill.

JOHNSON & Co., Isaac G., Spuyten Duyvil, N. Y. City.

MALLEABLE Iron Fittings Co., Branford, Conn.

MEEKER Foundry Co., 95 Clay St., Newark, N. J.

MESTA Machine Co., Pittsburg, Pa.

MOLINE Malleable Iron Co., St. Charles, Ill.

NAUGATUCK Malleable Iron Co., Naugatuck, Conn.

NORWAY Iron & Steel Co., York, Pa.

ORISKANY Malleable Iron Co., Oriskany, N. Y.

OSHKOSH Malleable Iron Co., Oshkosh, Wis.

RACINE Malleable & Wrought Iron Co., Racine, Wis.

RHODE Island Malleable Iron Works, Hills Grove, R. I.

SOUTH Side Steel & Malleable Casting Co., Windlake & 14th Aves., Milwaukee, Wis.

SPRINGFIELD Malleable Iron Co., Springfield, O.

SYRACUSE Malleable Iron Works, Syracuse, N. Y.

TERRE Haute Malleable & Mfg. Co., Terre Haute, Ind.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

UNITED States Malleable Iron Works, End of E. Broadway Line, Toledo, O.

WILMINGTON Malleable Iron Co., Wilmington, Del.

STEEL CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Road, Buffalo, N. Y.

ADRIAN Steel Casting Co., Adrian, Mich. (See page 371.)

AMERICAN Steel Castings Co., Chester, Pa.

ATHA Steel Co., Newark, N. J.

BETHLEHEM Steel Co., So. Bethlehem, Pa.

BUFFALO Crucible Casting Co., 25 Washington St., Buffalo, N. Y.

CARPENTER Steel Co., Reading, Pa.

CHESTER Steel Castings Co., Chester, Pa.

CHICAGO Steel Foundry Co., Chicago, Ill. (See pages 451 and 459.)

CHROME Steel Works, Chrome, N. J.

CRUCIBLE Steel Casting Co., Lansdowne, Pa.

CRUCIBLE Steel Castings Co., 612 Clinton St., Milwaukee, Wis.

FEDERAL Steel Foundry Co., Chester, Pa.

FLAGG & Co., Stanley G., Philadelphia, Pa.

FORT Pitt Steel Casting Co., McKeesport, Pa.

GERLINGER Steel Casting Co., 59th St. & National Ave., W. Allis, Wis.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

KEYSTONE Steel Casting Co., Chester, Pa.

LOGAN Mfg. Co., Phoenixville, Pa.

MALLEABLE Iron Fittings Co., Branford, Conn.

MASSACHUSETTS Steel Casting Co., West Everett, Mass.

MAYNARD Steel Foundry Co., 710-16 Reed St., Milwaukee, Wis. (See page 355.)

MESTA Machine Co., Pittsburg, Pa.

MICHIGAN Crucible Steel Castings Co., 249 Guyon St., Detroit, Mich.

MILWAUKEE Steel Foundry Co., South Water & Virginia Sts., Milwaukee, Wis.

NEW England Steel Castings Co., Hyde Park, Mass.

NEWARK Iron & Steel Co., Newark, O.

NEW Jersey Steel Co., Rahway, N. J.

NEW Process Steel Co., 210 W. River St., Marshall, Mich. (See page 253.)

NORTMANN-DUFFKE Foundry Co., 26th & Layton Aves., Milwaukee, Wis.

NORWAY Iron & Steel Co., York, Pa.

OTIS Steel Co., 3131 Lakeside Ave., N. E., Cleveland, O.

REED Mfg. Co., Kalamazoo, Mich.

RIVERSIDE Steel Casting Co., 451-473 Riverside Ave., Newark, N. J. (See page 91.)

SMITH Steel Castings Co., Geo. H., 500 Clinton St., Milwaukee, Wis.

STRONG Steel Foundry Co., 2677 Main St., Buffalo, N. Y. (See page 337.)

TAYLOR Iron & Steel Co., High Bridge, N. Y.

WESTERN Malleable Steel Co., 1250 Jefferson Ave., W., Detroit, Mich.

WHITELEY Steel Co., 108½ Jefferson St., Muncie, Ind.

WILMINGTON Malleable Iron Co., Wilmington, Del.

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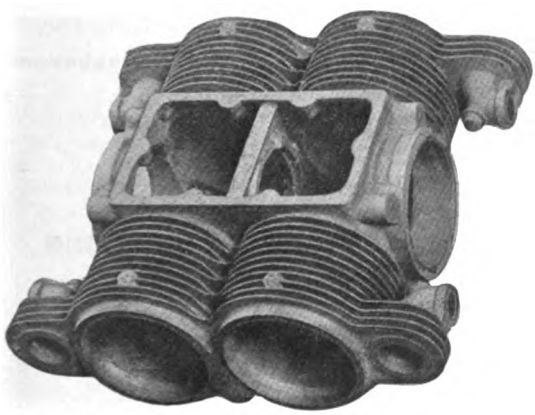
GRAY IRON CASTINGS

HIGHEST GRADE

UNIFORM QUALITY

WALKER FOUNDRY COMPANY

ERIE, PA.



Cylinder Castings

Highest Quality

Wherever your plant may be located it will pay to purchase cylinder castings in **Detroit.** We operate two foundries. In the old foundry experience was gained. In the NEW plant, modern equipment supplements experience. CYLINDERS can be rough bored and tested before shipment, insuring perfect work. ASK for references.

MICHIGAN MOTOR CASTINGS CO., Detroit

Foundry at FLINT, MICH.

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CATCHES

SPRING CABINET CATCHES AND FASTENERS

BRASS Goods Mfg. Co., 280 Nevins St., Brooklyn, N. Y.

CHAMPION Safety Lock Co., Geneva, O.

GAYNOR & Mitchell Mfg. Co., George & Oak Sts., Bridgeport, Conn.

READING Hardware Co., Reading, Pa.

SARGENT & Co., Water and Wallace Sts., New Haven, Conn.

SHELBY Spring Hinge Co., Shelby, O.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

CELLULOID

SHEET CELLULOID

(For windows in curtains and storm fronts)

ARLINGTON Co., 725-27 Broadway, New York, N. Y. "Pyralin." (See page 491.)

CELLULOID Co., 30 Washington Pl., New York, N. Y.

PYRALIN—See Arlington Co.

CEMENT

CAST IRON CEMENT

(For repairing cracks in castings)

BRAND Co., S. H., Chicago, Ill.

CLARK Cast Steel Cement Co., Shelton, Conn. "Steamtite."

CLEVELAND Steel Cement Co., 406 O'Brien Bldg., Cleveland, O. "Noxal."

JOHNS-MANVILLE Co., H. W., 100 William St., New York, N. Y. "Leak-No."

LEAK-NO—See Johns-Manville Co.

NOXAL—See Cleveland Steel Cement Co.

SHELTON Metallic Filler Co., Shelton, Conn.

SMOOTH-ON Mfg. Co., 572-74 Communipaw Ave., Jersey City, N. J.

STEAMTITE—See Clark Cast Steel Cement Co.

TIRE REPAIR CEMENT

ARNSTEIN, Eugene, 35th St. & Shields Ave., Chicago, Ill.

BROOKLYN Rubber Co., 397 Summer Ave., Brooklyn, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. and Erie R. R., Buffalo, N. Y.

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

COX, David H., Rahway, N. J.

DIAMOND Rubber Co., Akron, O.

EMPIRE Mfg. Co., Akron, O.

ENNIS Rubber Mfg. Co., Commercial St., Newark, N. J. (See page 199.)

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODYEAR Tire & Rubber Co., Akron, O. (See page 199.)

GRAYS—See Standard Leather Washer Mfg. Co.

HARTFORD Rubber Works Co., Hartford, Conn.

LYON Rubber Co., Akron, O.

M. & M. Manufacturing Co., Akron, O. (See page 38.)

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

MORGAN & Wright, Detroit, Mich. (See page 271.)

REPUBLIC Rubber Co., Youngstown, O. (See page 269.)

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

TINGLEY & Co., Chas. O., Rahway, N. J.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J. (See page 45.)

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J. (See page 383.)

CHAIN

TRANSMISSION OR DRIVING CHAIN

BALDWIN Chain & Mfg. Co., Worcester, Mass. (See page 87.)

BRAMPTON—See Miller, Chas. E.

DIAMOND Chain & Mfg. Co., 231 W. Georgia St., Indianapolis, Ind. (See page opposite.)

HOFFNUNG & Co., 116 Broad St., New York, N. Y. (Importers.) "Wormoroller."

LINK Belt Co., Philadelphia, Pa. "Renold."

MILLER, Chas. E., 97 Reade St., New York, N. Y. (Importer). "Brampton."

MORSE Chain Co., Ithaca, N. Y.

PEUGEOT Freres, 296 Broadway, New York, N. Y. (Importers).

RENOLD—See Link Belt Co.

WHITNEY Mfg. Co., Hartford, Conn. (See page 463.)

WORMOROLLER—See Hoffnung & Co.

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Diamond Chains Win Vanderbilt Cup Race

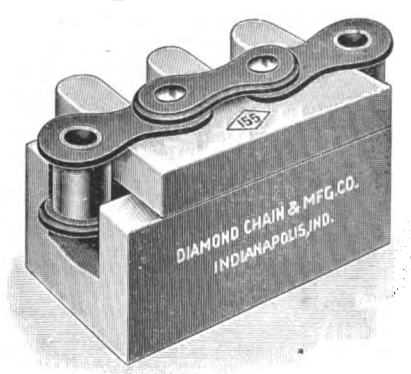
When prominent auto builders strive to make a reputation for themselves you can be assured that they select only the best material for their cars. This is especially true about chains, for the reliability, smooth running and wear-resisting qualities of the driving chains are important factors in the performance of the car.

That Diamond Chains helped Robertson and his Locomobile across the tape first in the Vanderbilt Cup, and were used on other competing cars, is another evidence that *Diamond Chains always were winners.*

This New Diamond Repair Block

should be in the tool box of every chain-driven car. With it you can remove a broken or defective link from any roller chain by two hammer blows on the rivet heads, put in a repair link and be on the road again in ten minutes. It saves space in your repair kit, weighs practically nothing and will outlast the rest of your outfit.

Riveted chains retain their pitch better than detachable chains and with this, the smallest and best repair device made, are easier to repair than are detachable chains.



WE MAKE CHAINS TO ORDER

We make sizes for every American car, and, in addition, our plant has every facility for doing special work at reasonable cost. Ask for our book, "Power Chains and Sprockets," which contains valuable data on power chains, and for pamphlet "D," giving sizes and lengths of chains used on American cars.

Write for Catalog

The DIAMOND CHAIN & MFG. CO.

Capacity 8,000,000 ft. per year

231 West Georgia Street, INDIANAPOLIS, IND.

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CHAINS

TIRE CHAINS

(For other Anti-Skid Devices—See Bands, Non-Skid; also Treads, Detachable)

ACME Tire Chain Co., 514 Pearl St., New York, N. Y.

AUTO Novelty & Supply Co., 184 Mathewson St., Providence, R. I.

BEAN Son Co., Cleveland, O. (See page 63.)

CANNE, H. L., Milford, Pa.

CHANDLER—See Strang Supply Co.

DEFIANCE Chain Co., 95 North Ave., Natick, Mass.

INVINCIBLE Tire Armor Co., Hartley, Ia. "Zigzag."

JOHNSON Sporting Goods Co., Iver, 163-65 Washington St., Boston, Mass.

STRANG Supply Co., Lewis, 1912 Broadway, New York, N. Y. "Chandler." (See page 497.)

VICTOR Tire Grip Co., Nashua, N. H.

WEED Chain Tire Grip Co., 28 Moore St., New York, N. Y. (See page 403.)

ZIGZAG—See Invincible Tire Armor Co.

CHANNELS

PRESSED STEEL CHANNELS

(See Frames, Pressed Steel)

CHECKS

STEERING GEAR CHECKS

ABRAMS-MASON Co., Chatham, N. Y. "Little Steersman."

BARKER, W. D., 113-15 S. Hayne Ave., Chicago, Ill.

LITTLE STEERSMAN—See Abrams-Mason Co.

CLAMPS

HOSE CLAMPS

CLANCY, J. R., 247 N. Salina St., Syracuse, N. Y. "Redfield." "Sure Grip."

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

METAL Stamping Co., 243 West St., New York, N. Y.

PHOENIX Hardware Mfg. Co., Homer, N. Y. "Star."

REDFIELD—See Clancy, J. R.

SCHRADER'S Son, A., 28-32 Rose St., New York, N. Y.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

STAR—See Phoenix Hardware Mfg. Co.

SURE GRIP—See Clancy, J. R.

SPRING REPAIR CLAMPS

AUTO Spring Repairer Co., 54 Maiden Lane, N. Y. City.

EMERGENCY Spring Repairer Co., 1906 Broadway, New York, N. Y.

WIRE ROPE CLAMPS

AMERICAN Hoist & Derrick Co., 63 S. Robert St., St. Paul, Minn.

BRODERICK & Bascom Rope Co., 809 N. Main St., St. Louis, Mo.

BRONSON-WALTON Co., Cleveland, O.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

LANZ & Son, Mathew, 2907 Carson St., Pittsburgh, Pa.

LESCHEN & Sons Rope Co., A., 920 N. First First St., St. Louis, Mo.

MACOMBER-WHYTE-MOON Co., 122 Centre St., New York, N. Y.

MACOMBER & Whyte Rope Co., 266-68 S. Clinton St., Chicago, Ill.

ROEBLING'S Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

UNION Elevator & Machine Co., 144 Ontario St., Chicago, Ill.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WRIGHT Wire Co., Worcester, Mass.

CLEATS

FIBRE WIRING CLEATS

(See also Fibre, Hard)

AMERICAN Vulcanized Fibre Co., Equitable Bldg., Wilmington, Del.

BLAKE Signal & Mfg. Co., 246 Summer St., Boston, Mass. (See page 341.)

NATIONAL Fibre Insulation Co., Yorklyn, Del.

CLIPS

TRIMMERS CLIPS

MEYER & Co., John C., Lowell, Mass.

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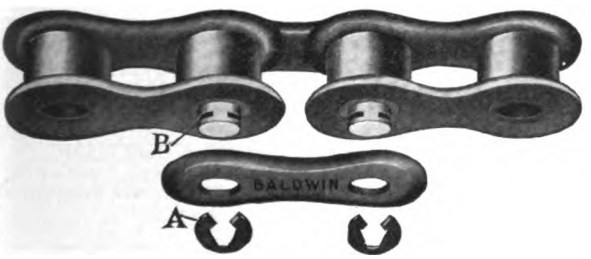
THE BALDWIN

IMPROVED

DETACHABLE CHAIN



Patented October 27, 1908.

Superior in design to any detachable chain ever offered the trade.

Observe the Clip "A", which inserted in the slot in the head of the Rivet "B" makes a broad bearing for retaining the side plate. It cannot cut off, nor come off. Yet it is easily removable by a crude tool or the special tool "C", Figure 2.

This tool "C" and extra clips are given out with each chain.

The riveted end of the stud is attached by the same superior method used in the construction of our riveted chains. See Figure 3.

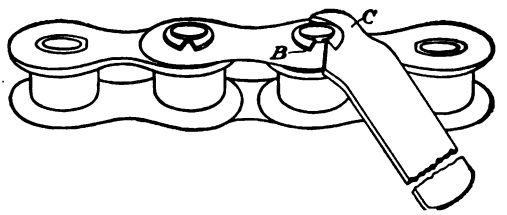


Figure 2.

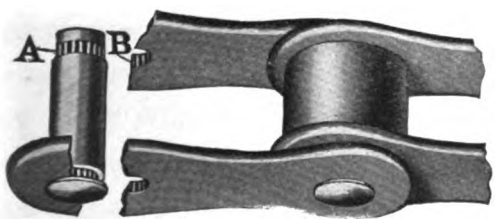


Figure 3.

The neck of the rivet "A," Figure 3, is a driving fit knurled and forced into the side link by power. This makes a connection that meets all requirements, and superior to any other.

MADE IN ALL SIZES—PRICES SAME AS OTHER CHAINS

SPROCKETS

OF ALL KINDS MADE BY US. LET US ESTIMATE ON YOUR REQUIREMENTS

BALDWIN CHAINS AND SPROCKETS

BALDWIN CHAIN & MFG. CO.

WORCESTER, MASSACHUSETTS

AGENTS

MR. H. V. GREENWOOD, 166 Lake Street, Chicago, Ill

MR. M. A. BRYTE, 718 Mission Street, San Francisco, Cal.

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CLOCKS

DASHBOARD CLOCKS

(See also Holders, Watch)

AMERICAN Electrical Novelty & Mfg. Co., 308 Hudson St., New York, N. Y. "Ever Ready."

ANGIER Co., 737 Boylston St., Boston, Mass. "Mascot."

CHELSEA Clock Co., 16 State St., Boston, Mass.
(See opposite and page 90.)

EVER READY—See American Electrical Novelty & Mfg. Co.

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass. "Volta."
(See page 437.)

INGERSOLL & Bro., Robert H., 53 Maiden Lane, New York, N. Y.

JONES Speedometer Co., New Rochelle, N. Y.

LEVY & Co., Manasseh, 182 Broadway, New York, N. Y. "Safety Offset."

MASCOT—See Angier Co.

NEVER-MISS Spark Plug Co., Lansing, Mich.
(See page 101.)

NEWMAN Clock Co., 1526 Wabash Ave., Chicago, Ill.

SAFETY OFFSET—See Levy & Co.

SMITH & Son, S., 116 Broad St., New York, N. Y. (Importers).

VOLTA—See Gordon Auto Supply Co.

CLOTH

RUBBER CLOTH

ACME Rubber Mfg. Co., Trenton, N. J.

CARR, F. S., 74 Pearl St., Boston, Mass. (Dealer).
(See page 505.)

CHASE Co., L. C., Boston, Mass. (Dealers).
(See page 65.)

FAIRFIELD Rubber Co., Fairfield, Conn.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

LAIDLAW, Jr., Wm. R., 244-50 W. 49th St., New York, N. Y.
(See page 471.)

MATTSON Rubber Co., Lodi, N. J.
(See page 151.)

MUTTY Co., L. J., Boston Mass. (Dealers).
(See page 279.)

NATIONAL India Rubber Co., Bristol, R. I.

UPHOLSTERY CLOTH

(See [illegible])

WIRE CLOTH

(For use in Strainers)

CLINTON Wire Cloth Co., Clinton, Mass.

MICHIGAN Wire Cloth Co., Howard & Wabash Sts., Detroit, Mich.

NEW Jersey Wire Cloth Co., Trenton, N. J.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

CLOTHING

MOTORISTS' CLOTHING

(See also Caps; also Gloves; also Leggings; also Mufflers)

ADIRONDACK—See Spear-Martin Fur Co.

ADLER Bros., 127 W. 42d St., New York, N. Y.

AMERICAN Buffalo Robe Co., Buffalo, N. Y.

AUTO Garment Co., 208 B Ave., Cedar Rapids, Ia.

BISHOP & Co., J. H., Wyandotte, Mich.

BOYNTON'S Improved Pioneer Oil Clothing Co., Vincent St., Gloucester, Mass.

BROOKS Bros., 22d St. & Broadway, New York, N. Y.

BROWN, Wm. W., Worcester, Mass.

CHICAGO Auto Robe Supply Co., 155-59 Market St., Chicago, Ill.

COOK & Bro., E. C., 49 E. Kinzie St., Chicago, Ill.

CROSBY Frisian Fur Co., 116 Mill St., Rochester, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

ELLSWORTH & Thayer Mfg. Co., 354 Broadway, Milwaukee, Wis.

ENTERPRISE Rubber Co., 110 Federal St., Boston, Mass.

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

GUNTHER'S Sons, G. C., 184 Fifth Ave., New York, N. Y.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

KLING Bros. & Co., 291 Fifth Ave., Chicago, Ill.

LUCENTA—See Regal Coat Co.

MACULLAR-PARKER Co., 400 Washington St., Boston, Mass.

MANN Co., Leon, 699 Broadway, New York, N. Y.

MILFORD Shoe Co., 177 Central St., Milford, Mass.

MILLER & Son, Louis F., 722 Broadway, New York, N. Y.

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

MORAWETZ Co., 343 Broadway, Milwaukee, Wis.

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THE JUSTLY CELEBRATED—8-DAY—HIGH GRADE

THE

"CHELSEA" AUTO CLOCK

(TRADE MARK)

BEST IN THE WORLD

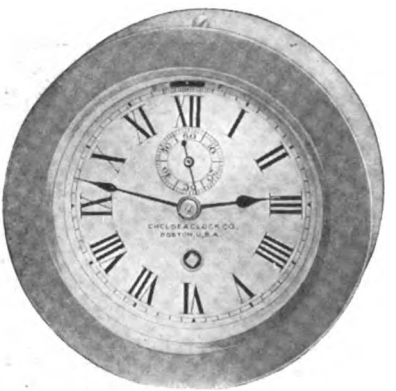
¶ Clocks built with a view to stand the jars and jolts and rough riding of Automobiles. Reputation the highest. Used by parties demanding the BEST.

* All sizes stated are the approximate diameters of the dials.

¶ To MANUFACTURERS AND SALES AGENCIES OF AUTOMOBILES: A "CHELSEA" Clock used in the LIMOUSINE, TONNEAU or on the Dashboard ADDS to the attractiveness of your goods and frequently induces sales. TRY IT.——————AND our new (patent applied for) exceedingly attractive, practically unstealable clock, for use instead of watches, in leather toilet case sets used in Limousines, Broughams, etc. Just what the trade and users have been wanting. See page 90.

"Special"

"Round"



"Offset"

"Limousine"

¶ Primarily intended for use inside the bodies of large enclosed cars, and for such use its case can be given a variety of fine finishes. It also makes an attractive clock for use on dashboards.

¶ Only made in 2¾ in. size.

¶ All are 8-day High Grade. All are in DUPLEX (patent applied for) polished cast brass cases, the most thoroughly water-proof case on the market. ¶ The "SPECIAL" clocks show dial on an angle; its inner cased clock when removed from outer (locked) case is excellent for use on mantels, bureaus, etc., when touring; its outer case is screwed to dashboard by hidden screws. The "SPECIAL" clocks are in large demand from dealers for owners of finest cars. ¶ The MOTOR CLOCK has the same clock movement which for years we have supplied for the hard use on Locomotives, Steam Fire Engines, etc., etc.; its dial is of same appearance as the Auto Clock dial, but the Auto Clock movement has a somewhat finer train. ¶ The 3½ MOTOR "OFFSET" is likely to prove a quick, ready seller. Very attractive.

PRICE LIST

Size	"ROUND"	"OFFSET"	"SPECIAL"	"LIMOUSINE"
2¾ in. Auto Clock	$26.00	$28.00	$36.00	$28.50
3½ in. Auto Clock	28.00	30.00	45.00	Only made in 2¾ in. size.
3½ in. Motor Clock	24.00	26.00	41.00	

YOU want the BEST? Ask for the "CHELSEA"

Chelsea Clock Co., 16 State St., Boston, U.S.A.

Makers of the justly celebrated "CHELSEA" 8-Day, High-Grade, Ship's Bell, Marine, Mantel, Office, and a full line of AUTO Clocks for Dashboard, Limousine and Tonneau.

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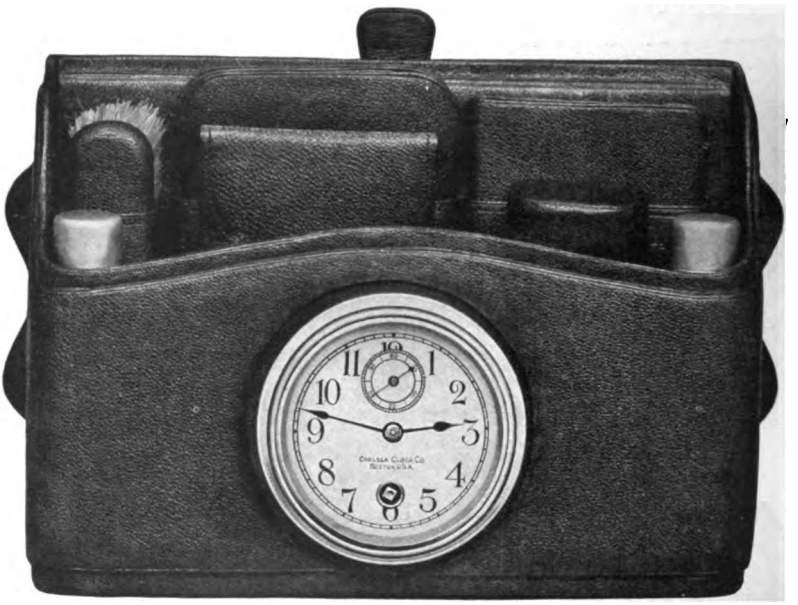
"CHELSEA" (For illustrations, prices, etc., of some of our other Auto Clocks see page 89) **"CHELSEA"**

OF INTEREST TO OWNERS AND MAKERS OF LIMOUSINE CARS, BROUGHAMS, ETC.

THE NEW **"Safety"** (Patent applied for) 8-DAY, HIGH-GRADE

"CHELSEA" LIMOUSINE CLOCK

A CLOCK DISTINCTIVELY for the use of the OWNER of the car and his GUESTS. PRACTICALLY UNSTEALABLE—a feature appreciated by owners. Clock easily and quickly secured in place by Self-contained Fastening Device. Once in Place—Difficult to Remove.



The "CHELSEA" 8-Day, High Grade "SAFETY" (Patent Applied for) LIMOUSINE CLOCK.

In ordering this Clock, specify it as **"SAFETY No. 195."**

We do NOT quote or sell the trays or canteens in which, as illustrated, the clock is used. Our Price List on the CLOCK is $26.00 per clock, with same Discounts and Terms to Dealers as on our other Auto Clocks. The tray or canteen shown in the illustration is of the well-known make of Mark Cross Co., New York, and they or other makers can supply various styles adapted to take this clock. No extra work—only just have the round hole in front 2 27/32 inches diameter—the round body of the clock case projects into the tray or canteen only 1 inch. Illustration shows the article in reduced size; the actual measurements are, viz.: Across the front of tray, 8½ inches; diameter of exposed part of clock dial, 2½ inches; but any size or style of tray can be used as long as the hole in front for taking clock is 2 27-32 inches diameter. Also can be used in Leather Dashboard Cases, etc.

YOU WANT THE BEST? Insist on the trays or canteens intended for use in your Limousine Cars and Broughams being equipped with the "CHELSEA" SAFETY LIMOUSINE CLOCK. An excellent timekeeper. Practically unstealable.

CHELSEA CLOCK CO., 16 State St., BOSTON, MASS.

Makers of the justly celebrated "CHELSEA" 8-Day, High Grade, Ship's Bell, Marine, Mantel, Office, and a full line of AUTO Clocks for Dashboard, Limousine and Tonneau.

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RIVERSIDE STEEL CASTING CO.

NEWARK, N. J.

TENSILE STRENGTH	ELASTIC LIMIT	ELONGATION	REDUCTION
70,180 lbs.	45,100 lbs.	26%	27.9%

DIRECT STEEL

FOR

AUTOMOBILES

TENSILE STRENGTH	ELASTIC LIMIT	ELONGATION	REDUCTION
79,580 lbs.	46,290 lbs.	26%	29.6%

The above tests were made for Steam Fittings used on

YALE and HARVARD
(METROPOLITAN S. S. LINE)

Of course you have heard about us—if you have not tried us
WRITE US

451-473 RIVERSIDE AVENUE, NEWARK, N. J.

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CLOTHING (Continued)

MOTORISTS' CLOTHING (Continued)

NATIONAL Casket Co., 264 Wabash Ave., Chicago, Ill.

NEW York Leather Coat Co., 207 Greene St., New York, N. Y.

OUR Own Mfg. Co., 568-74 Broadway, New York, N. Y.

PARKER, John H., 25 James St., Malden, Mass.

PIONEER Woolen Mills, 1020-40 Beaufait St., Detroit, Mich.

RAINO Co., 735 S. Halsted St., Chicago, Ill.

REGAL Coat Co., 36 E. 12th St., New York, N. Y. "Lucenta."

REVILLON Freres, 19 W. 34th St., New York, N. Y.

RICHARDSONS, 338 Washington St., Boston, Mass.

ROGERS, Peet & Co., 258 Broadway, New York, N. Y.

ROSENTHAL & Katz, 50-52 W. 18th St., New York, N. Y.

RUSZITS Fur Co., John, 69-73 E. 11th St., New York, N. Y.

SCANDINAVIAN Fur & Leather Co., 16 W. 33d St, New York, N. Y.

SEABOARD Rubber Co., 278 Pearl St., New York, N. Y.

SHUMAN & Co., A., Washington & Summer Sts., Boston, Mass.

SMITH, Crary & Davidge, 174 Water St., Binghamton, N. Y.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SPRAGUE Co., F. H., Orange, Mass.

STALL & Dean Mfg. Co., 23 Foundry St., Brockton, Mass.

TOPLITZ, George, 878 Broadway, New York, N. Y.

UPTHEGROVE Sporting Goods Co., Valparaiso, Ind.

WALLACE Co., Hugh, Boulevard & Orleans St., Detroit, Mich.

WILKINSON Co., John S., Newburgh, N. Y.

CLUTCHES

AUTOMOBILE FRICTION CLUTCHES

AKRON Clutch Co., Akron, O.

AMERICAN-BRITISH Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

AUTO Parts Mfg. Co., Muncie, Ind. "B.T.K."

B.T.K.—See Auto Parts Mfg. Co.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

CHICAGO Recording Scale Co., Waukegan, Ill. "Warner."

CONTINENTAL Motor Mfg. Co., Muskegon, Mich. (See page 181.)

GENERAL Mfg. Co., Richmond & MacDonald Sts., Elkhart, Ind.

HALL Machine Co., 54 N. Desplaines St., Chicago, Ill. (See page 393.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HELE-SHAW—See Merchant & Evans Co.

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 499.)

LAUTH-JUERGENS Motor Car Co., 94-98 Rawson St., Chicago, Ill.

LAWSON Mfg. Co., Homestead, Pa. (See page 417.)

LONG Arm System Co., Cleveland, O. (See page opposite.)

McCUE Co., Hartford, Conn. (See page opposite.)

MERCHANT & Evans Co., Philadelphia, Pa. "Hele-Shaw." (See page 327.)

NATIONAL Brake & Clutch Co., 16 State St., Boston, Mass. (Cork Insert Frictions only.) (See page 103.)

NORTH Chicago Machine Co., North Chicago, Ill. "Palmbla." (See page 429.)

NORTHWAY Motor & Mfg. Co., 510-14 Mayhury Grand Ave., Detroit, Mich. (See page 183.)

PALMBLA—See North Chicago Machine Co.

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis. (See page 123.)

STURTEVANT Mill Co., Harrison Sq., Boston, Mass.

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O. (See page 189.)

TRIUMPH Gear Works, 226-28 Abbott St., Detroit, Mich.

UNIVERSAL Clutch Co., 226 S. 11th St., Philadelphia, Pa.

VERSTRAETE-FYFE Mfg. Co., Burlington, Wis. (See page 59.)

WARNER—See Chicago Recording Scale Co.

WARNER Gear Co., Muncie, Ind. (See page 133.)

MARINE OR MOTOR BOAT CLUTCHES

(See Gears, Marine Reverse)

WHEEL RELEASING CLUTCHES

(Substitute for differential for High Wheel Buggies)

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

WIDE RANGE—See High Wheel Auto Parts Co.

COATS

AUTOMOBILE COATS

(See Clothing, Motorists')

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"Long-Arm" Transmissions

Three speeds and reverse, selective types. The best of material and workmanship. Our experience in gear cutting and manufacturing automobile parts enables us to equal the best transmissions built. Let us figure on your requirements.

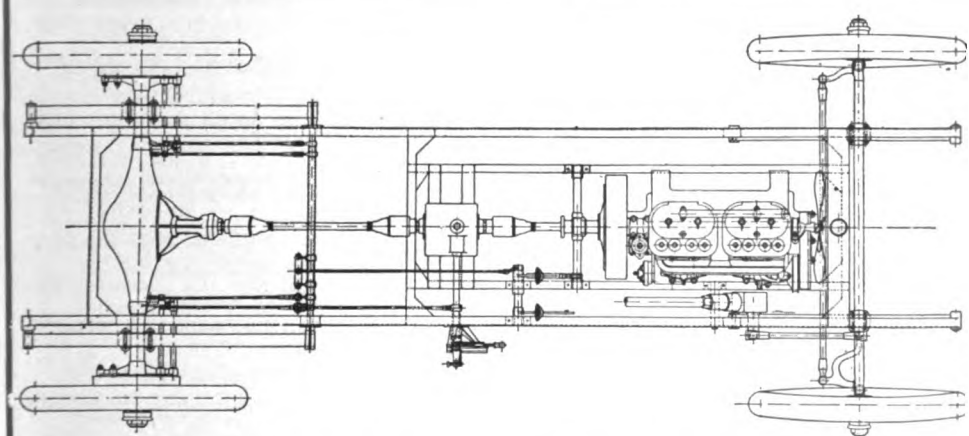
We also build a complete line of Axles, Clutches, Steering Reaches, Hand Levers, etc.

The "Long-Arm" System Co.

CLEVELAND, OHIO

SALES DEPT.:

The American Distributing Co., American Trust Bldg. Cleveland, Ohio



Floating Rear Axles,
I-Beam Front Axles,
Selective Transmissions,
Cone Clutches,

Wheels, Levers and
Complete Chassis,
also with body ready
to paint and trim.

Write for Catalog of Automobile Parts and Finished Cars.

The McCue Company, HARTFORD, CONN.

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COCKS

SPRING KEY COCKS

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.
(See page 423.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.
(See page 423.)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

STANDARD PET COCKS

ACORN Brass Mfg. Co., 51 N. Peoria St., Chicago, Ill.

BELFIELD & Co., H., 435 N. Broad St., Philadelphia, Pa.

BELKNAP Mfg. Co., Bridgeport, Conn.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

EAGLE Brass Works, Dubois & Franklin Sts., Detroit, Mich.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.
(See page 423.)

GLOBE Brass Works, 15-17 Macomb St., Detroit, Mich.

HAYDENVILLE Co., Haydenville, Mass.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

JARECKI Mfg. Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 227-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

NOLTE Brass Co., Springfield, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

REGESTER'S Sons Co., J., Holliday & Saratoga Sts., Baltimore, Md.

ROBERTS Brass Mfg. Co., 1395-1407 Fort St., W., Detroit, Mich.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

STANDARD Brass Works, 528 Woodbridge St., E., Detroit, Mich.

TURNER Brass Works, Sycamore, Ill.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

COILS

PIPE COILS

NATIONAL Pipe Bending Co., 110 River St., New Haven, Conn.
(See page 327.)

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn.
(See page 255.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

SPARK COILS

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco,"
(See page 49.)

APPLE—See Dayton Electrical Mfg. Co.

AUTOCOIL Co., 132 7th St., Jersey City, N. J.

BLISS—See Federal Mfg. Co.

CARTRIDGE—See Chicago Coil Co.

CHICAGO Coil Co., 36 La Salle St., Chicago, Ill. "Cartridge."
(See page 512.)

CONNECTICUT Telephone & Electric Co., 45 Britannia St., Meriden, Conn.
(See page 101.)

DAYTON Electrical Mfg. Co., 32 N. St. Clair St., Dayton, O. "Apple."

DOW Portable Electric Co., Adams St., Braintree, Mass.

DUPLEX Coil Co., Fond-du-Lac, Wis.
(See page 97.)

EISNER—See Gordon Auto Supply Co.

FEDERAL Mfg. Co., 194 Cushing St., Lowell, Mass. "Bliss."

FIRE BALL—See New York Coil Co.

FISCHER Ignition Co., 2076 Reading Rd., Cincinnati, O.

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass. "Eisner."
(See page 437.)

HEINZE Electric Co., Lowell, Mass.
(See page 231.)

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. (Importers.)
(See yellow insert.)

HIGH Frequency Ignition Coil Co., 2309 S. Main St., Los Angeles, Cal. "Seeley."

JACOBSON-BRANDOW Co., 86 North St., Pittsfield, Mass.

Complete Index to Classification appears on Pages 7 to 18.

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New Pittsfield Jewel Magneto Plug

The Pittsfield Plug

The ONLY Plug SPECIALLY Constructed for Use with Magneto

Double spark gap.
Double volume of spark.
Two big, fat, hot sparks force an explosion from any mixture, however poor. Cylinders **cannot** miss fire.
Solid mica insulation—no shellac, varnish or powdered mica and shellac used in construction of this plug; absolutely nothing about it that can be carbonized; so it **cannot break down.**

NEW PITTSFIELD SWITCH

The Only Magneto Copper Switch Ever
Made That Is Perfectly **Dependable**

OUR GUARANTEE IS ABSOLUTE

Positively **cannot** be **short circuited** by any combination of lever position and plug.
Stops are positive—lever **cannot** jar away from them.
Operated by either hand or foot, as is most convenient.
Most rigid in makeup.
A **hammer** will put this switch out of business, but ordinary abuse does not injure it.
Plug locked in position—cannot work loose.
Lever may be left on battery and plug removed without ruining the battery.
Insulation extra heavy and of the very best quality — cannot be broken down by the highest tension used.

PITTSFIELD SPARK COIL CO., Dalton, Mass.
N. Y. Sporting Goods Co., 17 Warren St., N. Y. Distributors

Something Distinctly NEW, NOVEL and BETTER than any coil you have ever seen before

The "WORCESTER" COIL

Highest Grade in Material and Workmanship
UNIT SYSTEM SIMPLE—DEPENDABLE—DURABLE

SPECIAL FEATURES Swings forward from dash on bracket. Allows the coil to be used on low dashes as it takes the minimum of space and allows when swung forward the removal of units, making the commutator wire connections, which are at the back, easily accessible. Reduces number of connections on bottom—reduces liability of short circuit and does away with connections at top of units which can be removd without discon nection of any wires.

Concealed micrometer adjustment for varying adjustment of spring vibrator independent of platinum points.

Fitted with switch for magneto and battery. High tension terminal has special contact features. The design of the "Worcester eliminates bucking.

All fittings and swing bracket of solid brass

Auto Manufacturers, Supply Dealers and Repairmen

This is something you should investigate—it's to your interest. An inquiry carries no obligation to go further. WRITE TO US — WRITE TODAY. You need this information before equipping your 1909 products

Manufactured by
W. H. LELAND & CO.
Worcester, Mass.

Patent pending for Swing Bracket, High Tension Terminal and other important features.

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COILS (Continued)

SPARK COILS (Continued)

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., High St. & L. S. & M. S. Ry., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., Kokomo, Ind. "Kingston." (See page 469.)

LELAND & Co., W. H., 1025 Southbridge St., Worcester, Mass. "Worcester." (See page 95.)

LEMKE-BRIGGS Electric Co., 112 Wisconsin St., Milwaukee, Wis. (See page 431.)

LUNDGREN Mfg. Co., 532 R. E. Trust Bldg., Philadelphia, Pa.

MANHATTAN Electrical Supply Co., 17 Park Place, New York, N. Y. "Mesco."

MESCO—See Manhattan Electrical Supply Co.

NATIONAL Coil Co., 420 Michigan Ave. E., Lansing, Mich. (See page opposite inside front cover.)

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y. "Fire Ball."

NOXON, C. Per Lee, 500 East Water St., Syracuse, N. Y.

OSHKOSH Electric Co., Oshkosh, Wis.

PFANSTIEHL Electrical Laboratory, North Chicago, Ill. (See page 97.)

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 95.)

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

RAPID FIRE—See Tritt Electric Co.

REMY Electric Co., Anderson, Ind. (See page 417.)

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich. (See page 97.)

SEELEY—See High Frequency Induction Coil Co.

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 433.)

THORDARSON Electric Mfg. Co., 153 S. Jefferson St., Chicago, Ill.

TRITT Electric Co., 301 S. Division St., Union City, Ind. "Rapid Fire." "Veribest."

UNITED States Coil Co., 60 Harrison Ave., Jersey City, N. J.

VERIBEST—See Tritt Electric Co.

WESTCHESTER Appliance Co., Ludlow Station, Yonkers, N. Y.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WICO—See Witherbee Igniter Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico." (See page 205.)

WORCESTER—See Leland & Co.

COLORS

COACH COLORS

(See Paints and Colors)

COLUMNS

WATER COLUMNS AND BOILER ALARMS

KITTS Mfg. Co., 111-15 Water St., Oswego, N. Y.

LOCKE Regulator Co., 76 North St., Salem, Mass.

RELIABLE Water Gauge Co., 1616 Pine St., St. Louis, Mo.

RELIANCE Gauge Column Co., 45 E. Prospect St., Cleveland, O.

WRIGHT Mfg. Co., 55-59 Woodbridge St., Detroit, Mich.

COMMUTATORS

ELECTRIC MOTOR COMMUTATORS

CAMERON Electric Mfg. Co., A. P., Ansonia, Conn.

COLUMBIA Machine Works, Brooklyn, N. Y.

EUREKA Tempered Copper Works, Northeast, Pa.

HOMER Commutator Co., Cleveland, O.

VAN DORN Electric Mfg. Co., Cleveland, O.

SPARK COMMUTATORS

(See Timers, Ignition)

COMPOUNDS

ANTI-FREEZING COMPOUNDS

AUTO Radium Co., 80 Rozelle Ave., E. Cleveland, O.

CARBONDALE Chemical Co., Carbondale, Pa.

MARX & Rawolle, 98 William St., New York, N. Y.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J. (See page 383.)

Complete Index to Classification appears on Pages 7 to 18.

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CIVIL ENGINEERS

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NEW YORK

FOR 15 YEARS MAKERS OF THE **BEST**

HERZ MAGNETO

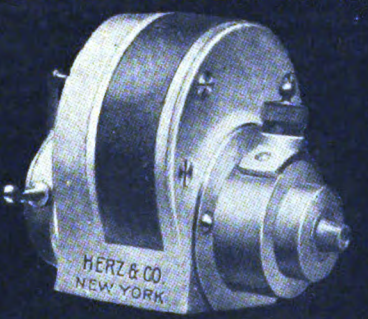
THE SMALLEST, MOST COMPACT AND MOST EFFICIENT MAGNETO MADE

SPECIAL MOTOCYCLE TYPES

Made of the Finest Styrian Magnet-Steel. Magnets Have No Pole Pieces. Armature Fits Closely Into Ground Surface of Tunnel-shaped Magnet Poles. No Losses. 50% Higher Efficiency than Any Other Magneto Made

DON'T BUY MAGNETOS UNTIL YOU SEE IT

HERZ MAGNETO



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HAND LEVER FRICTION PUMP

(TANDEM)

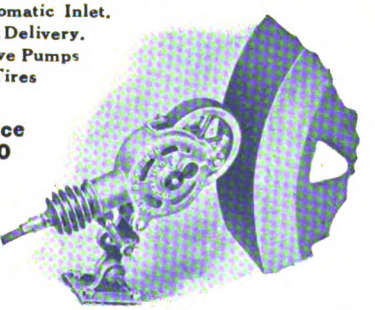
New Improved Pattern.

An absolutely reliable power-pump. Kept in the tool box until needed. Driven by friction from the flywheel. Piston rings. Made to last. Pumps up largest tire in 3-5 minute.

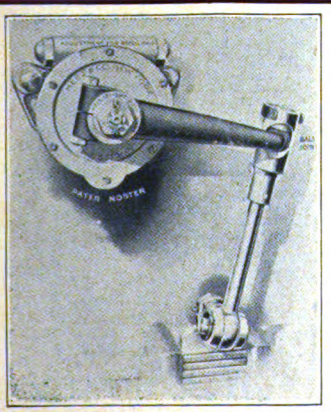
Price $20

POWER PUMP (UNIVERSAL)

A Friction-Driven Power Pump. Piston Rings. No Leather Packing. Automatic Inlet. Ball Delivery. Valve Pumps up Tires



Price $20



HERZ'S Shock Absorber

P. N.

The only Shock Absorber allowing separate adjustment both ways and support of the spring when needed

$60 a set of 4

ASBESTOS COPPER GASKETS

Largest stock in America

Over 1200 sizes in stock both round or oval

WRITE US YOUR REQUIREMENTS

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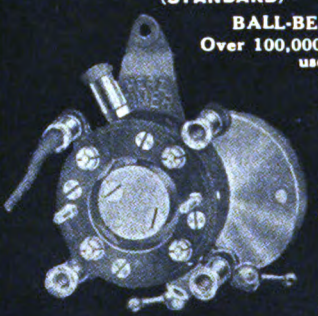
HERZ & CO.

CIVIL ENGINEERS
Cor. Lafayette and Houston Streets
NEW YORK

FOR 15 YEARS MAKERS OF THE BEST

HERZ TIMER
(STANDARD)



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Over 100,000 in constant use

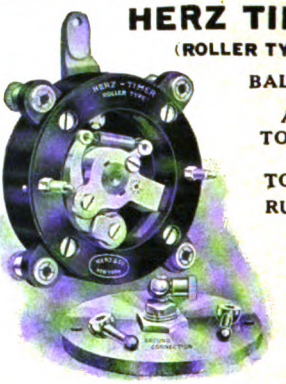
Tool Steel vs. Tool Steel

The one always dependable and reliable circuit breaker.

Ask for special buggy type

New Reduced Prices

HERZ TIMER
(ROLLER TYPE)



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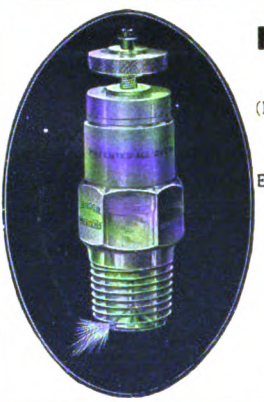
ALWAYS TOOL STEEL vs. TOOL STEEL RUNNING IN OIL

We Make 12 Different Types of Timers Write us Your Requirements

HERZ PLUG
(Bougie Mercedes)



Magneto Type

Especially designed for magneto use

Double Stone

No Cracking Porcelain

List $1.50

HERZ PLUG
(Bougie Mercedes)

Double Stone

Absolutely self-cleaning

Absolutely proof against soot or oil, needs never be taken out of motor.

The best value in spark plugs ever offered.

Postpaid everywhere

$1.50

HERZ DISTRIBUTOR

The smallest, most compact instrument made. With a single coil and 4 plugs, it gives the most complete and reliable ignition outfit.

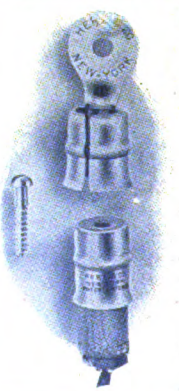
Double ball bearing, spring ball connections.

No experiment, a tried out device.

The ideal outfit for double ignition. 2 3, 4, 6-Cyl.

New Reduced Prices

HERZ DETACHABLE TERMINALS



4 Sizes:
inch
inch

Wire Terminals with Groove

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DUPLEX SPARK COILS

Two Cores
Two Primaries
Two Secondaries
One Vibrator

are more rapid, more durable, develop more power and give greater all-around satisfaction than any other coil made.

Ask us for prices and reasons why.

THE DUPLEX COIL CO., Fond du Lac, Wis. Dept. A.

Schug Electric Accessories

have been adopted by many prominent manufacturers and dealers because of their **quality.** Every part of our extensive line is the result of years of study and experience and is as perfect as can be made.

THE SCHUG SPARK COIL is the hardest working and most reliable coil ever installed. It gets **every fraction** of power from the engine. Positively the best not only at its price but at **any** price.

SCHUG ELECTRIC MFG. CO., 326 Jefferson Ave., DETROIT, MICH.

Switches
Plugs
Timers
Storage Batteries
Ignition Dynamos
Magnetos
Portable Battery Lamps
Primary Wire
Secondary Wire

PFANSTIEHL COILS

Winding guaranteed for five years

Positively the only coil made that can not be broken down in secondary winding on high voltage.

Every unit is an X Ray coil perfect in action and practical for X Ray photography.

Equipped with the most rapid vibrator ever used. One adjustment, and

Four Cylinder Coil with Switch Interchangeable Units.

that practically permanent. **Noiseless vibrators. A long life to the contacts. Remarkably low current consumption.** These are a few of our claims, and manufacturers should not fail to investigate them before closing their contracts. We could interest you more by quoting prices. Reply, Dept. A.

PFANSTIEHL ELECTRICAL LABORATORY NORTH CHICAGO, ILLINOIS

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COMPOUNDS (Continued)

CYLINDER CLEANING COMPOUNDS

ANTI-SELENITE Co., 2230 Olive St., St. Louis, Mo.

AUTO Specialty Co., 330 N. Illinois St., Indianapolis, Ind. "Karbon Kutter."

CAM—See Murphey Mfg. Co.

CAR-BO-NIT—See Willits Auto Accessory Mfg. Co.

CARBONOLA Chemical Co., Fargo, N. D.

CARBO-SOL—See Standard Leather Washer Mfg. Co.

GENERAL Accumulator & Battery Co., 152 Second St., Milwaukee, Wis. "Radium Decarbonizer."

KARBON KUTTER—See Auto Specialty Co.

KREMBS & Co., 55 Waldo Pl., Chicago, Ill. "Purgcarbon."

LA FRANCE De Carboniser Co., 522 Cleveland Ave., Chicago, Ill.

MURPHEY Mfg. Co., Sioux City, Ia. "Cam."

PETERSON Co., T. J., Northwestern Block, Chicago, Ill. "Solvolite."

PREST-O-LITE Co., Indianapolis, Ind.

PURGCARBON—See Krembs & Co.

RADIUM DECARBONIZER—See General Accumulator & Battery Co.

SOLVOLITE—See Peterson Co.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Carbo-Sol."

WILLITS Auto Accessory Mfg. Co., Alexis, Ill. "Car-Bo-Nit."

PUNCTURE CLOSING COMPOUNDS

KARL & Co., Adolf, 239 Washington St., Newark, N. J. (Importers), "Permanit."
(See pink insert.)

PERMANIT—See Karl & Co.

RADIATOR CLEANING COMPOUNDS

AUTO Radium Co., 80 Rozelle Ave., E. Cleveland, O.

AUTO Specialty Co., 330 N. Illinois St., Indianapolis, Ind. "Kalcium Kutter."

CABRERA Chemical Co., 111 Nassau St., New York, N. Y. "No Lye."

CALLAHAN & Co., John, 119 Chamber of Commerce Bldg., Chicago, Ill. "Fluff-Foe."

FLUFF-FOE—See Callahan & Co.

KALCIUM KUTTER—See Auto Specialty Co.

NAUTOLEAK Co., 112 Water St., Boston, Mass.

"NO LYE"—See Cabrera Chemical Co.

TIRE FILLING COMPOUNDS

AUTO Tire Filling Machine Co., 92 La Salle St., Chicago, Ill.
(See page 361.)

TIRE PRESERVING COMPOUNDS

MYHTIB Composition Co., 286 Asylum St., Hartford, Conn.
(See page 439.)

RUBBERLIFE Mfg. Co., Shephard Bldg., Grand Rapids, Mich.

TIRE REPAIR COMPOUNDS

(Compound for filling cuts in outer casings)

C. O. T. GUM GUM—See Tingley & Co.

COX, David H., Rahway, N. J.

FILLEM—See Greenwald Rubber Co.

GRAYS—See Standard Leather Washer Mfg. Co.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

TINGLEY & Co., C. O., Rahway, N. J. "C. O. T. Gum Gum."

VALVE GRINDING COMPOUNDS

AUTO Equipment Co., 16 Hollywood Ave., E. Orange, N. J. "Eureka."

BROWN Co., 517 E. Water St., Syracuse, N. Y.

CLOVER Mfg. Co., 1876 Broadway, New York, N. Y.

DIAMOND PULVIS—See Strang Supply Co.

ESSEX Mfg. & Supply Co., Newark, N. J. "Rapidcut."

EUREKA—See Auto Equipment Co.

GRAYS—See Standard Leather Washer Mfg. Co.

GRYNDYN—See Pearsall Bros.

MOHAWK Grinding Paste Mfg. Co., Schenectady, N. Y.

NATIONAL Valgrinok Co., 200 Summer St., Boston, Mass. "Valgrinok."

PEARSALL Bros., 2148 Broadway, New York, N. Y. "Gryndyn."
(See page 509.)

RAPIDCUT—See Essex Mfg. & Supply Co.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

STRANG Supply Co., Lewis, 1912 Broadway, New York, N. Y. "Diamond-Pulvis."
(See page 497.)

VALGRINOK—See National Valgrinok Co.

CONDENSERS

STEAM CONDENSERS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

NATIONAL Oil Burner & Equipment Co., Holland Bldg., St. Louis, Mo.

ROME-TURNEY Radiator Co., Rome, N. Y.
(See page opposite.)

WALKER Mfg. Co., E. C., 811 Nelson St., Louisville, Ky.

WHITLOCK Coil Pipe Co., Hartford, Conn.

Complete Index to Classification appears on Pages 7 to 18.

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NOTICE!

CHANGE OF NAME

THE LONG-TURNEY MANUFACTURING CO.

OF

ROME, N. Y.

WILL HEREAFTER BE KNOWN AS

ROME-TURNEY RADIATOR CO.

WITH SAME PLACE OF BUSINESS

ROME, N. Y.

124773

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CONES

BALL CONES

(See Cups, Ball)

CONNECTIONS

BRASS WATER CONNECTIONS

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J.
(See page 109.)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

TURNER Brass Works, Sycamore, Ill.

WHITLOCK Coil Pipe Co., Hartford, Conn.

STEERING CONNECTIONS

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

CINCINNATI Ball Crank Co., 1642-48 Central Ave., Cincinnati, O.

COLUMBUS Screw-Machine Co., 244-46 Kaiser St., Columbus, O.

DAVIS & Co., W. J., 716 Tenth Ave., New York, N. Y.

LONG Arm System Co., Cleveland, O.
(See page 93.)

SCHWEPPE & Wilt, Congress & Sixth Sts., Detroit, Mich.

TIRE PUMP CONNECTIONS

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

ECLAIR—See Lovell-McConnell Mfg. Co.

EVERTIGHT—See Smith Bros.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y.

KENO—See Stevens & Co.

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J. "Eclair."
(See page 115.)

NATIONAL Stamping & Electric Works, 153-59 S. Jefferson St., Chicago, Ill.
(See page 375.)

NOERA Mfg. Co., Griggs St., Waterbury, Conn.

OSBORNE & Stephenson Mfg. Co., Plainville, Conn.
(See page 141.)

PERFECT—See Youse, E. S.

SCHRADER'S Son, A., 30-32 Rose St., New York, N. Y.

SMITH Bros., Melrose, Mass. "Evertight."

STERLING Machine & Stamping Co., Vermillion, O.
(See page 459.)

STEVENS & Co., 99 Chambers St., N. Y City. "Keno," "Swivel K."

SWIVEL K—See Stevens & Co.

WARNER Instrument Co., 341 Wheeler Ave., Beloit, Wis.
(See page 221.)

YOUSE, E. S., 46 N. Fifth St., Reading, Pa. "Perfect."

CONNECTORS

BATTERY CONNECTORS

(See also Terminals, Wire)

AMERICAN Electrical Novelty & Mfg. Co., 308 Hudson St., New York, N. Y. "Bull Dog."

AUTO Accessory Co., 75 Florence St., Worcester, Mass. "Presto."

BARCY & Nicholson, 967 Howard St., Detroit, Mich.

BLISS-CHESTER Co., 31 Mathewson St., Providence, R. I.

BRIGGS, W. H., 329 Chestnut St., Richmond Hill, N. Y.

BULL DOG—See American Electrical Novelty & Mfg. Co.

EASTERN Carbon Works, W. Bergen St., Jersey City, N. J.

ELECTRIC Motor & Equipment Co., 13-15 Beaver St., Newark, N. J.

GOODSON Electric & Mfg. Co., Providence, R. I.
(See page opposite.)

HERZ & CO., Lafayette and Houston Sts., New York, N. Y.
(See yellow insert.)

LEMKE-BRIGGS Electric Co., 112 Wisconsin St., Milwaukee, Wis.
(See page 431.)

LOBSTER CLAW—See Tregoning Electric Mfg. Co.

LOCKWOOD Ash Motor Co., 210 W. Cortland St., Jackson, Mich.

LOMBARDI Motor Co., Derby, Conn.

MILLS—See Stackpole Battery Co.

NEVER-MISS Spark Plug Co., Lansing, Mich.
(See page opposite.)

NOSLIP Tire Protector Co., 111 Broadway, New York, N. Y. "Securo."

O. K. Connector Co., 51 Waldo St., Worcester, Mass.

PRESTO—See Auto Accessory Co.

SECURO—See Noslip Tire Protector Co.

SHAIN, Chas. D., 70 Murray St., New York, N. Y.
(See page 265.)

STACKPOLE Battery Co., St. Marys, Pa. "Mills."

STANDARD Battery Connections Co., 27 Copeland St., Roxbury, Mass.

TREGONING Electric Mfg. Co., 224 High St., S. E., Cleveland, O. "Lobster Claw."

ELECTRIC LAMP CONNECTORS

FOWLER Lamp & Mfg. Co., 2333-37 Wabash Ave., Chicago, Ill.
(See page 455.)

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico."
(See page 205.)

Complete Index to Classification appears on Pages 7 to 18.

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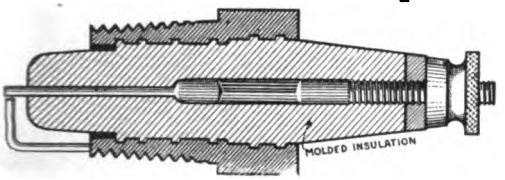
The Whole Value of a Spark Plug Lies in Its Insulation.



The Schenectady is perfectly insulated with a moulded compound that is unbreakable under any sudden changes of temperature or high voltage. This is an especially good plug for handling by up-to-date dealers, who, while being alive to the necessity of serving their patrons with all that's right and proper, still have an eye out to the matter of profit. The Schenectady is both, it is the best spark plug made and it carries a profit in the selling that's all to the good.

Ask for Prices and Samples. To-day

SCHENECTADY SPARK PLUG CO.

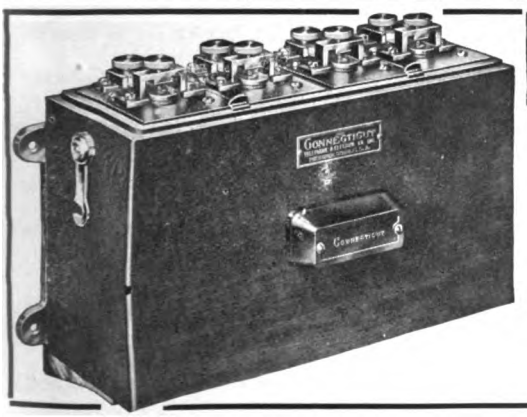
Liberal Discounts to Dealers. **No. 1259 State Street, Schenectady, New York**

Battery Connectors and Wire Terminals

Get our samples and prices before buying.

For garages we are putting out a special case containing 100 connectors and 400 terminals (100 of each of 4 sizes). Each size terminal in separate compartment. This case should be in every garage. Price $4.00.

Goodson Electric and Manufacturing Co., Providence, R. I.



CONNECTICUT

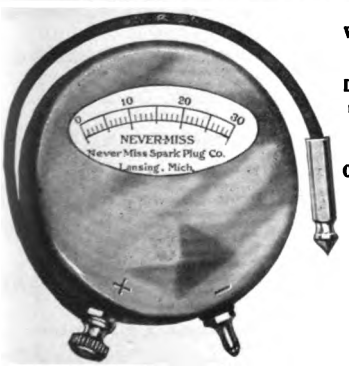
Either Four-Unit Coil or Single Unit with Distributor.

THE CONNECTICUT Ignition System

Marks the High-Grade Car

Connecticut Tel. & Elec. Co.

45 Britannia Street, Meriden, Conn.



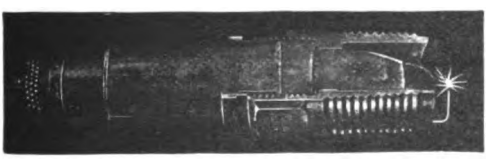
NEVER-MISS
Wire Terminals and Battery Connections
Patent applied for

Do You Want to Know About the Best Ammeter, Combination Volt Ammeter r Volt Meter Made and 33 1-3 per cent Profit.

We make the Famous Never-Miss Plug—Porcelain, Mica and Lava.

You Lose Money by Not Selling NEVER-MISS Specialties.

Our Battery Connections are Used the World Over. Send for Catalogue Today.



With leather case, $2.00, guaranteed one year **NEVER-MISS SPARK PLUG CO., LANSING, MICH.**

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CONTROLLERS

ELECTRIC MOTOR CONTROLLERS

(For varying speed of electric vehicles)

ELWELL-PARKER Electric Co., 4225 St. Clair Ave., Cleveland, O. **(See page 19.)**

GENERAL Electric Co., Schenectady, N. Y.

LINCOLN Electric Co., 38th St. & Kelley Ave., N. E., Cleveland, O.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

COOLERS

WATER COOLERS

(See Radiators, Water Cooling)

COPPER

SHEET AND ROD COPPER

(See Brass, Sheet)

TUBE COPPER

(See Tubing, Brass)

CORDS

SEAMING CORDS

MEYER & Co., John C., Lowell, Mass.

CORK

BRAKE AND CLUTCH INSERTS

NATIONAL Brake & Clutch Co., 16 State St., Boston, Mass. **(See page opposite.)**

COUNTER-SHAFTS

FINISHED COUNTER-SHAFTS

(For High Wheel Buggies)

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

COUPLINGS

HOSE COUPLINGS

(See Clamps, Hose)

PIPE COUPLINGS

(See Fittings, Pipe)

TUBE COUPLINGS

(See Unions, Tubing)

COVERS

AUTOMOBILE COVERS

(For covering automobiles when in the garage)

AMERICAN Karbel Co., Jonesboro, Ark.

BURGIN Bros., Springfield, Mass.

DUANE & Co., W. J., 1771 Broadway, New York, N. Y.

GILBERT Mfg. Co., New Haven, Conn. **(See page 265.)**

HOLCOMB Co., 105 Goffe St., New Haven, Conn.

LANDERS Bros. Co., Toledo, O., & Boston, Mass.

VEHICLE Apron & Hood Co., Columbus, O. **(See page 135.)**

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn.

LAMP COVERS

ALLEN Auto Specialty Co., 1931 Broadway, New York, N. Y.

BLIZZARD—See Vehicle Apron & Hood Co.

EMPIRE Rubber Co., 45 Lafayette St., New York, N. Y.

GIFFORD & Son, John A., 25 Park Place, N. Y. City.

GILBERT Mfg. Co., New Haven, Conn. **(See page 265.)**

JENKINS Specialty Mfg. Co., 37 N. Main St., Sumter, S. C.

LANDERS Bros. Co., Toledo, O., & Boston, Mass.

LONDON Auto Supply Co., 1235 Michigan Ave., Chicago, Ill. **(See page 457.)**

MONARCH Auto Top & Supply Co., 1218-20 Michigan Ave., Chicago, Ill.

NATHAN Novelty Mfg. Co., 84-90 Reade St., New York, N. Y. **(See page 227.)**

RACINE Buggy Top Co., Racine, Wis.

VEHICLE Apron & Hood Co., Columbus, O. "Blizzard." **(See page 135.)**

Complete Index to Classification appears on Pages 7 to 18.

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Cork Insert

PATENTED

Leather Faced Cone Clutches

ARE LONG LIVED
AND VERY EFFICIENT

The G. N. Pierce Co.
Great Arrow Clutch.

We claim that if the leather-faced cone clutch is fitted with Cork Inserts the life of the clutch is enormously increased and believe that, as Automobile Manufacturers are striving to build Motor Cars that will give the best possible service with the least outlay for repairs, the use of these Cork Inserts Clutches in 1909 will greatly exceed that of 1908.

"Cork Inserts take practically the entire wear and the leather clutch facings or metal surfaces, as they are not brought into slipping contact, neither burn, become brittle, glazed, worn, cut or scored."

We license Automobile Manufacturers and Auto Parts Manufacturers to equip their Clutches and Brakes with Cork Inserts, or Clutches and Brakes may be purchased from

Auto Parts Mfg. Co., Muncie, Ind.
Leather Faced Cone with Cork Inserts.
Bronze Faced Cone with the Cork Inserts.

The "Long Arm" System Co., Cleveland, O.
Leather Faced Cone with Cork Inserts.

General Mfg. Co., Elkhart, Ind.
Leather Faced Cone with Cork Inserts.

Verstraete-Fyfe Mfg. Co., Burlington, Wis.
Three or Five Plate Disc Clutches and
Leather Faced Cone with Cork Inserts.

Continental Motor Mfg. Co., Muskegon, Mich.
Three or Five Plate Disc Clutches with
Cork Inserts.

Northway Motor & Mfg. Co., Detroit, Mich.
Three or Five Plate Disc Clutches
and Leather Faced Cone with Cork Inserts.

Milwaukee Motor Co., Milwaukee, Wis.
Three or Five Plate Disc Clutches and
Leather Faced Cone with Cork Inserts.

National Brake & Clutch Co.

16 STATE STREET, BOSTON

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COVERS (Continued)

LAMP COVERS (Continued)

VEHICLE Top & Supply Co., 900-06 Cass Ave., St. Louis, Mo. "Vesco."
(See page 277.)

VESCO—See Vehicle Top & Supply Co.

WILEY & Son Co., Wm. H. 1217 Main St., Hartford, Conn.

OIL HOLE COVERS

BAY State Stamping Co., 380 Chandler St., Worcester, Mass. "Bennett," "Handy."

BENNETT—See Bay State Stamping Co.

BOWEN Mfg. Co., 16 Canal St., Auburn, N. Y.

ELLIOTT Chemical Works, Newton, Mass.

HANDY—See Bay State Stamping Co.

TUCKER, W. H. & C. F., Hartford, Conn.
(See page 69.)

WINKLEY Co., 866 Warren Ave., W., Detroit, Mich.

STARTING CRANK COVERS

(See Holders, Starting Crank)

STEERING KNUCKLE COVERS

(See Boots, Steering Knuckle)

CRANKSHAFTS

FINISHED OR MACHINED CRANKSHAFTS

(For Crankshafts in the rough—See Forgings, Drop)

AMERICAN & British Mfg. Co., Bridgeport, Conn.

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich.
(See page 307.)

ATLAS Mfg. Co., Fostoria, O.
(See page 389.)

AUTO Crank Shaft Co., 192-96 Piquette Ave., Detroit, Mich.

CARPENTER Steel Co., Reading, Pa.

CHESTER Forging & Engineering Co., Fourth & Booth Sts., Chester, Pa.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

ERIE Forge Co., 15th & Cascade Sts., Erie, Pa.

FUNK Engineering Co., 39-45 14th St., Hoboken, N. J.

GILL & Sons Forge & Machine Works, P. H., 1 Lorraine St., Brooklyn, N. Y.
(See page 319.)

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.)
(See page 325.)

JOLIET Forge Co., Joliet, Ill.
(See page 339.)

LELAND & Co., W. H., 1025 Southbridge St., Worcester, Mass.
(See page 95.)

NATIONAL Engineering Co., Saginaw, Mich.

NEW Process Steel Co., 210 W. River St., Marshall, Mich.
(See page 253.)

NORTON Grinding Co., Worcester, Mass.

OBENBERGER Co., John, 220 Lake St., Milwaukee, Wis.

STANDARD Connecting Rod Co., Beaver Falls, Pa.
(See page 117.)

SUNDBERG-KROPP & Co., 1121-31 W. 21st St., Chicago, Ill.

TINDEL-MORRIS Co., Eddystone, Pa.

WYMAN & Gordon Co., Worcester, Mass., & Cleveland, O.
(See page opposite.)

CRANKS

SAFETY STARTING CRANKS

BARBER—See Motor Safety Mfg. Co.

MOTOR Safety Mfg. Co., 247 Water St., Brooklyn, N. Y. "Barber."

CUPS

BALL CUPS AND CONES

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 357.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CHICAGO Screw Co., 519 Homan Ave., Chicago, Ill.

CORBIN Screw Corporation, New Britain, Conn.

CROSBY Co., Buffalo, N. Y.
(See page 249.)

DETROIT Screw Works, Detroit, Mich.
(See page 483.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 481.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 499.)

NATIONAL Cycle Mfg. Co., Bay City, Mich.

PENINSULAR Milled Screw Co., 751 Bellevue Ave., Detroit, Mich.

REESE Machine & Tool Works, S., 224 W. Main St., Plymouth, Pa.

SCHWEPPE & Wilt, Congress & Sixth Sts., Detroit, Mich.

WESTERN Automatic Machine Screw Co. Elyria, O.

WORCESTER Pressed Steel Co., Barbers Crossing, Mass.
(See page 339.)

Complete Index to Classification appears on Pages 7 to 18.

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CUPS (Continued)

OIL AND GREASE CUPS

(See also Lubricators; also Covers, Oil Hole)

ACTIVE—See Sherman Mfg. Co.

ALBANY Lubricating Compound & Cup Co., 313 West St., New York, N. Y. (Grease Cups only.)

AMERICAN Injector Co., Detroit, Mich.

AMERICAN Lubricator Co., 93 Catherine St. Detroit, Mich.

BAY State Stamping Co., 380 Chandler St., Worcester, Mass.

BESLY & Co., Chas. H., 15-21 S. Clinton St., Chicago, Ill.

BOWEN Mfg. Co., 16 Canal St., Auburn, N. Y. "Empress."

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

COOKS Sons, Adam, 313 West St., New York, N. Y. (Grease Cups only.) (See page 163.)

CRANE Co., 519 S. Canal St., Chicago, Ill.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

EMPRESS—See Bowen Mfg. Co.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

GUARDIAN—See Sherman Mfg. Co.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

IDEAL—See Lunkenheimer Co.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

KELLY & Jones Co., Greensburg, Pa.

LION—See Lunkenheimer Co.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O. "Ideal," "Lion," "Pioneer," "Royal," "Sentinel," "Tiger."

MICHIGAN Lubricator Co., 661-73 Beaubein St., Detroit, Mich.

MOGUL—See Powell Co.

PENBERTHY Injector Co., 360 Holden Ave., Detroit, Mich.

PERFECT—See Sherman Mfg. Co.

PIONEER—See Lunkenheimer Co.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O. "Mogul," "Signal."

PREMIUM—See Sherman Mfg. Co.

ROYAL—See Lunkenheimer Co.

SENTINEL—See Lunkenheimer Co.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich. "Premium," "Perfect," "Guardian," "Active."

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

SIGNAL—See Powell Co.

SOUTH Park Mfg. Co., Port Huron, Mich.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

THEIM—See Winkley Co.

TIGER—See Lunkenheimer Co.

TUCKER, W. H. & C. F., Hartford, Conn. (See page 69.)

TURNER Brass Works, Sycamore, Ill.

WALWORTH Mfg. Co., Boston, Mass. (See page 345.)

WILLIAMS Valve Co., D. T., 904 Sycamore St., Cincinnati, O.

WINKLEY Co., 866 Warren Ave., W., Detroit, Mich. "Theim."

SPRING KEY PRIMING CUPS

(For Ordinary Priming Cups—See Cocks, Standard Pet)

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

CUSHIONS

SPECIAL SEAT CUSHIONS

(For Ordinary Cushions—See Bodies; also Tops)

PNEUMATIC Mfg. Co., 3 South St., New York, N. Y.

TUFTING Machine Supply Co., 1202 Michigan Ave., Chicago, Ill. (See page 453.)

VENTILATED Cushion & Spring Co., Jackson, Mich. (See page 419.)

DASHES

LEATHER DASHES

INDIANAPOLIS Dash Co., 2116 S. Meridian St., Indianapolis, Ind.

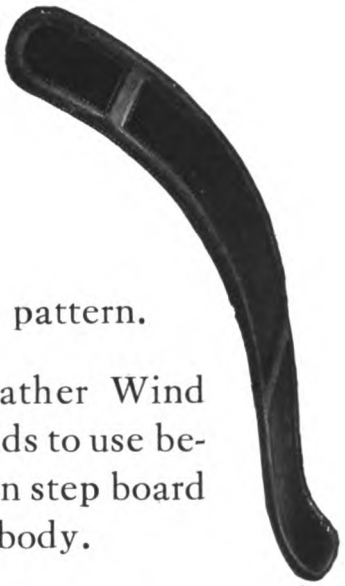
McKINNON Dash Co., Black Rock Station, Buffalo, N. Y. (See page opposite.)

NEW YORK Dash & Fender Co., 516-20 W. 36th St., New York, N. Y.

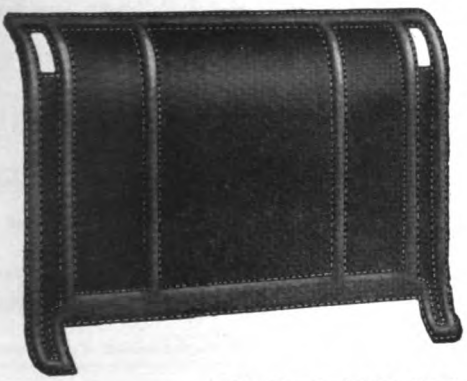
PETERS & Herron Dash Co., Gift & Culbertson Sts., Columbus, O.

UNITED States Dash & Fender Co., 147 E. 42d St., New York, N. Y.

Leather Dashes and Fenders



Any shape or size made to your pattern.



Leather Wind Shields to use between step board and body.

Send us your patterns for prices.

LICENSE PADS

White or Black Leather stitched on light, strong steel frame.

McKINNON DASH CO.

BLACK ROCK STATION

BUFFALO, N. Y.

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DASHES (Continued)

METAL DASHES

A. H. & S. Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill. (See page opposite.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page opposite.)

DETROIT Auto Specialty Co., 910 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See page 455.)

KINSEY Mfg. Co., Dayton, O. (See page 143.)

MULLINS Co., W. H., 124 Franklin St., Salem, O.

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y. (See page 147.)

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WOOD DASHES

ACME Veneer Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page 53.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DISCS

RADIATOR DISCS OR FINS

BLISS-CHESTER Co., 31 Mathewson St., Providence, R. I.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page opposite.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

STEEL CLUTCH DISCS

BARRY Disk & Saw Co., 226-32 S. Penn St., Indianapolis, Ind.

CLIMAX Machinery Co., Indianapolis, Ind.

CROSBY Co., Buffalo, N. Y. (See page 249.)

DISTRIBUTERS

SPARK DISTRIBUTERS

(See Timers, Ignition)

DRESSING

CARBURETER FLOAT DRESSING

(Substitute for shellac for coating cork floats)

BERTOLET, Dr. John M., Reading, Pa.

CLUTCH AND BELT DRESSING

CLEVELAND Auto-Clutch Dressing Co., Cleveland, O.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Velvet."

VELVET—See Standard Leather Washer Mfg. Co.

VICTOR Clutch Compound Co., Nashua, N. H. (See page 315.)

LEATHER TOP DRESSING

BUFFALO Specialty Co., 373 Ellicott St., Buffalo, N. Y. "Peerless." (See page 239.)

CARR, F. S., 74 Pearl St., Boston, Mass. "Ze-nole." (See page 505.)

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "King."

CUMMER Co., James W., 2993 E. 34th St., Cleveland, O. "Perfect Auto Gloss." (See page 257.)

DIX Mfg. Co., Lewistown, Pa. "Martins."

JEWELL Mfg. Co., 914 Marshall Blvd., Chicago, Ill.

KING—See Chicago White Lead & Oil Co.

MARTINS—See Dix Mfg. Co.

MILLER CO., Frank, 349-51 W. 26th St., New York, N. Y.

MONTGOMERY-WASHBURN Co., Saugerties, N. Y.

PEERLESS—See Buffalo Specialty Co.

PERFECT AUTO GLOSS—See Cummer Co.

R. N. Leather Dressing Co., Pawtucket, R. I.

WEISS & Son, Chas., 4800 Cottage Grove Ave., Chicago, Ill. (See page 115.)

WEST Mfg. Co., Rockford, Ill. (See page 257.)

ZE-NOLE—See Carr, F. S.

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AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CROSBY Co., Buffalo, N. Y. (See page 249.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 119.)

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HYDRAULIC Pressed Steel Co., Cleveland, O. (See back cover.)

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 499.)

PARISH & Bingham Co., Cleveland, O. (See page 121.)

PARISH Mfg. Co., Seventh & Chestnut Sts., Reading, Pa.

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis. (See page 123.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

DUSTERS

MOTORISTS DUSTERS

(See Clothing, Motorists')

DYNAMOMETERS

TESTING DYNAMOMETERS

SPRAGUE Electric Co., 527-31 W. 34th St., New York, N. Y.

DYNAMOS

BATTERY CHARGING DYNAMOS AND MOTOR GENERATORS

ALLIS-CHALMERS Co., Milwaukee, Wis.

BRUCE-MERRIAM-ABBOTT Co., Columbus Rd., Cleveland, O.

C. & C. Electric Co., Garwood, N. J.

CROCKER-WHEELER Co., Ampere, N. J.

ECK Dynamo & Motor Co., Belleville, N. J. (See page 491.)

ELWELL-PARKER Electric Co., 4225 St. Clair Ave., Cleveland, O. (See page 19.)

ENGINEERING Specialty Co., 143 Liberty St., New York, N. Y.

FAIRBANKS, Morse & Co., Wabash Ave. & Eldredge St., Chicago, Ill.

FORT Wayne Electric Works, Broadway & P. R. R., Fort Wayne, Ind.

GENERAL Electric Co., Schenectady, N. Y.

HOLTZER-CABOT Electric Co., Brookline, Mass.

LINCOLN Electric Co., 38th St. & Kelley Ave., N. E., Cleveland, O.

NATIONAL Stamping & Electric Works, 153-59 S. Jefferson St., Chicago, Ill. (See page 375.)

NORTHERN Electrical Mfg. Co., Madison, Wis.

PEERLESS Electric Co., Warren, O.

PHOENIX Electric Co., Mansfield, O.

ROBBINS & Myers Co., Lagonda Ave., Springfield, O.

ROTH Bros. & Co., 27 S. Clinton St., Chicago, Ill.

SPRAGUE Electric Co., 527 W. 34th St., New York, N. Y.

TRIUMPH Electric Co., 610 Baymiller St., Cincinnati, O.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

IGNITION DYNAMOS

(See Magnetos, Ignition)

ECONOMIZERS

FUEL ECONOMIZERS

G. L. ECONOMIZER Co., Times Bldg., New York, N. Y. (See page opposite.)

PEERLESS Specialty Co., 1876 Broadway, New York, N. Y.

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STEAM EJECTORS

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LOCKE Regulator Co., 76 North St., Salem, Mass.

PENBERTHY Injector Co., 360 Holden Ave., Detroit, Mich.

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y. "Eagle."

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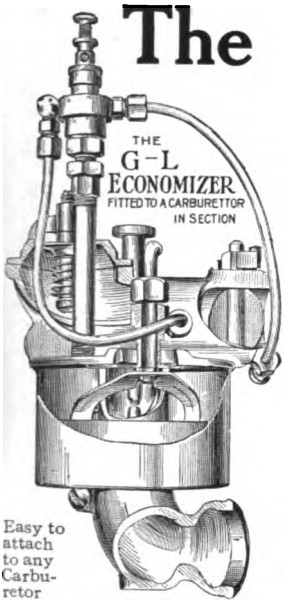
The G-L Economizer



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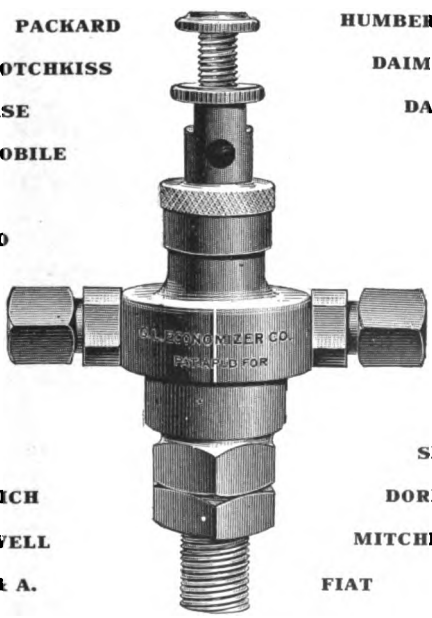
C. V. G.
COLUMBIA
LOCOMOBILE
ROYAL TOURIST
BUICK
LOZIER
DRAGON
SIMPLEX
DE DETRICH
DORIS
MAXWELL
MITCHELL
G. & A.
FIAT



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(See Fittings, Pipe)

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KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y.
(See page opposite.)

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BRODESSER Elevator Mfg. Co., Burleigh & Weil Sts., Milwaukee, Wis.

COHOES Iron Foundry & Machine Co., Cohoes, N. Y.

EATON & Prince Co., 76 Michigan St., Chicago, Ill.

HOUGHTON Elevator & Machine Co., 114-30 S. Huron St., Toledo, O.

HOYT Elevator Co., 129 Pearl St., Boston, Mass.

KIECKHEFER Elevator Co., A., 1026-1104 St. Paul Ave., Milwaukee, Wis.

MOLINE Elevator Co., Moline, Ill.

OTIS Elevator Co., Yonkers, N. Y.

REEDY Co., H. J., 11-15 W. Second St., Cincinnati, O.

REEDY Elevator Mfg. Co., J. W., 91 Illinois St., Chicago, Ill.

SEDGWICK Machine Works, Poughkeepsie, N. Y.

STORM Mfg. Co., 50 Vesey St., Newark, N. J.

UNION Elevator & Machine Co., 144-46 Ontario St., Chicago, Ill.

WARNER Elevator Mfg. Co., 2600 Spring Grove Ave., Cincinnati, O.

ENAMELS

AUTOMOBILE ENAMELS

(See Paints, Enamel)

ENGINES

GASOLINE ENGINES

(See Motors, Gasoline)

KEROSENE ENGINES

(See Motors, Kerosene)

STEAM AUTOMOBILE ENGINES

DETROIT Steam Engine Co., 15 Gilman St., Detroit, Mich. "McLachlin."

DIETER Steam Engine Co., 123 Liberty St., New York, N. Y.

McLACHLIN—See Detroit Steam Engine Co.

MASON Regulator Co., 153 Summer St., Boston, Mass.

OFELDT & Sons, F. W., Nyack-on-the-Hudson, N. Y.

WALKER Mfg. Co., E. C., 811 Nelson St., Louisville, Ky.

EXAMINERS

FINANCIAL EXAMINERS

BROOKS, Jr., & Co., Henry W., 15 Wall St., New York, N. Y.
(See page 37.)

EXTINGUISHERS

FIRE EXTINGUISHERS

BADGER Chemical Mfg. Co., 143 Reed St., Milwaukee, Wis. "Mitchell," "Copper King."

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BOYD & Bro., James, 12-14 N. Fourth St., Philadelphia, Pa. "Keystone," "Paragon."

BUCKLAND Fire Extinguisher Co., 575 Lyell Ave., Rochester, N. Y.

CHILDS Co., O. J., 48-50 Liberty St., Utica, N. Y. "Utica."

COPPER KING—See Badger Chemical Mfg. Co.

ECLIPSE—See Haverhill Fire Appliance Co.

FYRICIDE Mfg. Co., 34 Murray St., New York, N. Y.

HARRIS Safety Co., 39 E. 20th St., New York, N. Y.

HAVERHILL Fire Appliance Co., 40 Merrimac St., Haverhill, Mass. "Eclipse."

HAYWARD & Co., S. F., 20 Warren St., New York City.

JOHNS-MANVILLE Co., H. W., 100 William St., New York, N. Y.

KEYSTONE—See Boyd & Bro.

LIBERTY Association, 12 State St., Chicago, Ill.

LITTLE Giant Mfg. Co., 88 Wall St., New York, N. Y.

MARTEN-DIGGS Fire Extinguisher Co., 141 Centre St., New York, N. Y.

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(See page 113.)

MITCHELL—See Badger Chemical Mfg. Co.

MONARCH Fire Appliance Co., 249 Pearl St., New York, N. Y.

NEVERMISS Fire Extinguisher Co., Middletown, N. Y.

PARAGON—See Boyd & Bro.

PHOENIX Fire Appliance Co., 34 W. 26th St., New York, N. Y.

PHYRENE Co., 34 W. 33d St., New York, N. Y.

REX Fire Extinguisher Co., 74 Cortlandt St., New York, N. Y.

ROCKFORD - KALAMAZOO Fire Extinguisher Co., State & Main Sts., Rockford, Ill.

STEMPEL Fire Apparatus Mfg. Co., 4520 N. 20th St., St. Louis, Mo.

SYRACUSE Chemical Fire Extinguisher Co., 226 Kirk Bldg., Syracuse, N. Y.
(See page 113.)

TEA Tray Mfg. Co., Mulberry & Murray Sts., Newark, N. J.

UTICA—See Childs Co.

EYES

SCREW-EYES

(See Screw-Eyes)

FANS

RADIATOR FANS

(See also Radiators)

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J.
(See page 109.)

CARY Co., Edward E., 59-61 Park Place, New York, N. Y. (Importers). "Sankey."

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

KINSEY Mfg. Co., Dayton, O.
(See page 143.)

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.
(See page 147.)

SANKEY—See Cary Co.

FASTENERS

CURTAIN FASTENERS

BREWSTER—See Cowles & Co.

CARR, F. S., 74 Pearl St., Boston, Mass.
(See page 505.)

COWLES & Co., C., New Haven, Conn. "Brewster," "Excelsior," "Ideal," "Perfect."
(See page 143.)

CRANDALL, Stone & Co., Binghamton, N. Y.

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

ELGIN Carriage Trimming Co., Brook & River Sts., Elgin, Ill.

ENGLISH & Mersick Co., New Haven, Conn.

EXCELSIOR—See Cowles & Co.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill.
(See page 451.)

GOSHEN Eyelet Co., Goshen, Ind.

HIGGIN Mfg. Co., Newport, Ky.

IDEAL—See Cowles & Co.

JITSU—See L. & D. Mfg. Co.

JONAH & George, Merrimac, Mass.

L. & D. Mfg. Co., 86-90 Broad St., Boston, Mass. "Jitsu."

METAL Stamping Co., 243-45 West St., New York, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.
(See page 233.)

NEIDER Co., F. A., Augusta, Ky. "Peerless."
(See page opposite.)

PARRY & Co., A. N., Amesbury, Mass.

PEERLESS—See Neider Co.

PERFECT—See Cowles & Co.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STRONG, M. H., 168 South Ave., Rochester, N. Y.
(See page 135.)

TURNER Brass Works, Sycamore, Ill.

UNITED States Fastener Co., 95 Milk St., Boston, Mass.
(See page opposite.)

WEISS & Son, Chas., 4800 Cottage Grove Ave., Chicago, Ill.
(See page opposite.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.
(See page 141.)

HOOD FASTENERS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

ENGLISH & Mersick Co., New Haven, Conn.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

KINSEY Mfg. Co., Dayton, O.
(See page 143.)

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.
(See page 141.)

FENDERS

MUD FENDERS

See Guards, (Mud)

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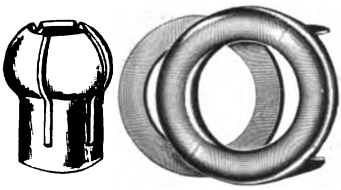

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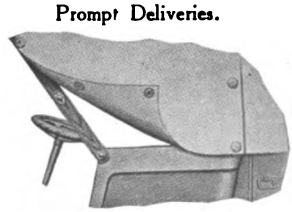

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CONTINENTAL Fibre Co., Newark, Del.

DELAWARE Hard Fibre Co., Wilmington, Del.

DIAMOND State Fibre Co., Elsmere, Del.

NATIONAL Fibre Insulation Co., Yorklyn, Del.

ROYAL Fibre Co., Cambridge, Mass.

STANDARD Fibre Co., Miller St., Cambridge, Mass.

FILLERS

PAINT FILLERS

CINCINNATI Color Co., Eighth & Evans Sts. Cincinnati, O.

HOPKINS Varnish Co., 85-91 Vesey St., Newark, N. J. (See page 291.)

JOHNSTON Paint Co., 226 Main St., Cincinnati, O. "Krakno."

KEYSTONE Paint & Filler Co., Muncy, Pa.

KRAKNO—See Johnston Paint Co.

NICE, Eugene E., 272 S. Second St., Philadelphia, Pa.

RENO Bros. Paint Co., Pulaski, Pa.

ST. LOUIS Surfacer & Paint Co., St. Louis, Mo. (See page 195.)

SMITH & Co., Edward, 45 Broadway, New York, N. Y.

FINS

RADIATOR FINS

(See Discs, Radiator)

FITTINGS

BRASS PIPE FITTINGS

(For Tubing or Brazing Fittings—See Unions, Tubing)

BARRETT Mfg. Co., James, 48 Pearl St., Boston, Mass.

BELFIELD & Co., H., 435 N. Broad St., Philadelphia, Pa.

BEST Manufacturing Co., Pittsburg, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CENTRAL Brass Works, 322 W. Pearl St., Cincinnati, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

DALTON-INGERSOLL Mfg. Co., 171-75 High St., Boston, Mass.

DARLING Pump & Mfg. Co., Williamsport, Pa.

DETROIT Sanitary Supply Co., Detroit, Mich.

EASTWOOD Wire Mfg. Co., Belleville, N. J.

EATON, Cole & Burnham Co., 510 Main St., Bridgeport, Conn.

FEWLESS-LEEN Brass & Iron Co., Cincinnati, O.

HAMLIN & Emery Brass Co., 26 Island St., Boston, Mass.

HUMPHREYS Mfg. Co., Mansfield, O.

IDEAL Manufacturing Co., Detroit, Mich.

ILLINOIS Malleable Iron Co., 535 Diversey Blvd., Chicago, Ill.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

JARECKI Manufacturing Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

KINSEY & Mahler Co., Peoria, Ill.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McDONALD & Morrison Manufacturing Co., A. Y., Dubuque, Iowa.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 227-35 Campbell Ave., Detroit, Mich.

MANSFIELD Manufacturing Co., Pittsburg, Pa.

MILWAUKEE Brass Mfg. Co., Milwaukee, Wis.

MULLANEY'S Sons, Jas., 141 E. 25th St., New York, N. Y.

PITTSBURG Valve & Fittings Co., 1610 Frick Bldg., Pittsburg, Pa.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

POWHATTAN Brass & Iron Works, Charlestown, W. Va.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

REGESTER'S Sons Co., J., Holliday & Saratoga Sts., Baltimore, Md.

RUNDLE-SPENCE Mfg. Co., 57 Second St., Milwaukee, Wis.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

SPEAKMAN Supply & Pipe Co., Wilmington, Del.

STANDARD Sanitary Mfg. Co., Pittsburg, Pa.

STEBBINS Mfg. Co., E., Springfield, Mass.

THOMAS Brass and Iron Co., Waukegan, Ill.

TURNER Brass Works, Sycamore, Ill.

WALWORTH Mfg. Co., Boston, Mass. (See page 345.)

WESTERN Tube Co., Kewanee, Ill.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

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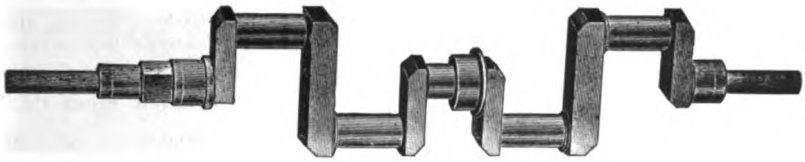

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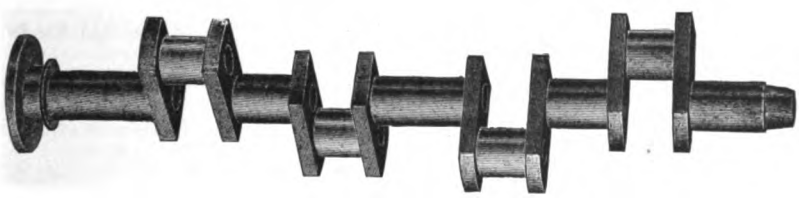

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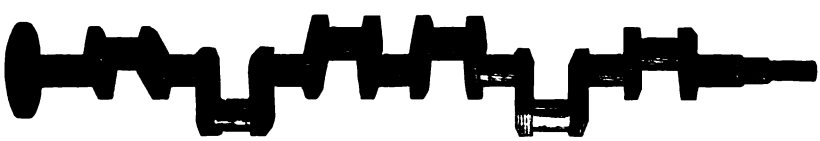

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FITTINGS (Continued)

TOP FITTINGS AND FIXTURES

(See also Bows, Top; also Fasteners, Curtain; also Irons, Slat; also Irons, Top; also Rests, Bow; also Separators, Bow; also Sockets, Bow; also Straps, Top)

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CORTLAND Forging Co., Cortland, N. Y.

CRANDALL, Stone & Co., Binghamton, N. Y.

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich. (See page 63.)

ENGLISH & Mersick Co., New Haven, Conn

EVANS Mfg. Co., 118 W. Brookline St., Boston, Mass.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. (See page 507.)

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

GLOBE Brass Works, 15-17 Macomb St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

METAL Stamping Co., 243 West St., New York City.

MONARCH Carriage Goods Co., 2838-44 Spring Grove Ave., Cincinnati, O.

MURPHY Co., G. W. J., Merrimac, Mass. (See page 233.)

NON-CORROSIVE Metal Co., Watertown, Mass. (See page 233.)

PARRY & Co., A. N., Amesbury, Mass.

SCHERER & Co., H., 280 Jefferson Ave., Detroit, Mich.

SMITH & CO., Jos. N., 154-62 Fourth St., Detroit, Mich.

FLANGES

PRESSED STEEL HUB FLANGES

(For Forged or Cast Flanges—See Forgings; also Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CROSBY Co., Buffalo, N. Y. (See page 249.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page opposite.)

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HARTFORD Machine Screw Co., Hartford, Conn. (See page 481.)

HYDRAULIC Pressed Steel Co., Cleveland, O. (See back cover.)

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio. (See page 499.)

PARISH Mfg. Co., Seventh & Chestnut Sts., Reading, Pa.

PARISH & Bingham Co., Cleveland, O. (See page 121.)

STANDARD Welding Co., Cleveland, O. (See page 263.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

FLOATS

CORK CARBURETER FLOATS

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

METAL CARBURETER FLOATS

CROSBY Co., Buffalo, N. Y. (See page 249.)

GOODNOW & Blake Mfg. Co., Fourth & Porter Sts., Detroit, Mich.

GOODWIN & Kintz Co., Winsted, Conn. (See page 65.)

HERCULES Float Works, 200 Franklin St., Springfield, Mass.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio. (See page 499.)

NAUGATUCK Mfg. Co., Naugatuck, Conn.

TURNER Brass Works, Sycamore, Ill.

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

FORGINGS

DROP FORGINGS

AMERICAN & British Mfg. Co., Bridgeport, Conn.

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich. (See page 307.)

ATLAS Drop Forge Co., Lansing, Mich. (See page 315.)

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Our Facilities for Making

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PRESSED STEEL	Frames Radius Rods Rear Axle Housing Small Parts
HAMMER FORGED	Cranks Front Axles
MACHINED AND GROUND	Parts of All Description

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FORGINGS (Continued)

DROP FORGINGS (Continued)

ATWATER Mfg. Co., Southington, Conn.

BARNETT Drop Forging Co., East Hampton, Mass.
(See page 477.)

BATES Forge Co., Indianapolis, Ind.
(See page 359.)

BELDEN Machine Co., Whalley Ave. & Tryon St., New Haven, Conn.

BETHLEHEM Steel Co., So. Bethlehem, Pa.

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

BLAKESLEE Forging Co., Plantsville, Conn.

CAMBRIA Forge Co., Johnstown, Pa.

CANTON Drop Forging & Mfg. Co., Canton, O.
(See page 317.)

CAPE Ann Tool Co., Granite St., Pigeon Cove, Mass.

CARPENTER Steel Co., Reading, Pa.

CHICAGO Drop Forge & Foundry Co., 115th Place & M. C. Ry., Kensington, Ill.

CLAPP Mfg. Co., E. D., Auburn, N. Y.

CLEVELAND Hardware Co., 45th St. & Lakeside Ave., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

COLUMBUS Forge & Iron Co., First Ave. & Perry St., Columbus, O.
(See page 119.)

CONSOLIDATED Mfg. Co., Toledo, O.
(See page 113.)

CORTLAND Forging Co., Cortland, N. Y.

CRESCENT Forgings Co., Oakmont, Pa.

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Steel Products Co., 89 Fort St., E., Detroit, Mich.

DRIGGS-SEABURY Ordnance Corporation, Sharon, Pa.
(See page 119.)

ECCLES, Richard, Auburn, N. Y.

FOREST City Electric Co., 5003 Windsor Ave., Cleveland, O.

GENERAL Drop Forge Co., 1738-56 Elmwood Ave., Buffalo, N. Y.

GRANGER'S Drop Forge Works, 25-29 S. Canal St., Chicago, Ill.

INDIANAPOLIS Drop Forging Co., Madison Ave. & Downing St., Indianapolis, Ind.

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.)
(See page 325.)

JACKSON Drop Forging Co., Jackson, Mich.

KEYSTONE Drop Forge Works, Chester, Pa.

KILBORN & Bishop Co., 81 Lloyd St., New Haven, Conn.

MACHINERY Forging Co., Hamilton & Marquette Sts., Cleveland, O.

MICHIGAN Bolt & Nut Works, foot of Meldrum Ave., Detroit, Mich.

MOORE Drop Forging Co., Birnie Ave., Springfield, Mass.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

OHIO Forge Co., 2200 65th St., S. E., Cleveland, O.

PAGE-STORMS Drop Forge Co., Chicopee, Mass.
(See page 309.)

PARK Drop Forge Co., 750 E. 79th St., Cleveland, O.
(See page 399.)

REVERE Drop Forge Co., Revere, Mass.

RICHMOND Forging Corporation, Belle Isle, Richmond, Va.

SCRANTON Forging Co., Scranton, Pa.

SEWARD & Son Co., M., Grant St., New Haven, Conn.

SMITH & Co., H. D., Plantsville, Conn.

SPRINGFIELD Drop Forging Co., Springfield, Mass.
(See page 313.)

SUNDBERG-KROPP & Co., 1121-31 W. 21st St., Chicago, Ill.

STRIEBY & Foote Co., 201 Ogden St., Newark, N. J.

TRASNUE & Williams Co., Alliance, Ohio.

UNION Drop Forge Co., 67 Indiana St., Chicago, Ill.

WESTERN Drop Forge Co., Marion, Ind.
(See page 317.)

WESTERN Malleable Steel Co., 1250 Jefferson Ave., W., Detroit, Mich.

WHITMAN & Barnes Mfg. Co., Chicago, Ill.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

WILLIAMS & Co., J. H., 150 Hamilton Ave., Brooklyn, N. Y.

WYMAN & Gordon Co., Worcester, Mass., & Cleveland, O.
(See page 105.)

FRAMES

PRESSED STEEL FRAMES

AMERICAN & British Mfg. Co., Bridgeport, Conn.

DRIGGS-SEABURY Ordnance Corporation, Sharon, Pa.
(See page 119.)

HYDRAULIC Pressed Steel Co., Cleveland, O.
(See back cover.)

KINSEY Mfg. Co., Dayton, O.
(See page 143.)

PARISH Mfg. Co., 7th & Chestnut Sts., Reading, Pa.

PARISH & Bingham Co., Cleveland, O.
(See page opposite.)

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

FRICTIONS

FIBRE FRICTIONS

(For use in Friction Transmissions)

ROCKWOOD Mfg. Co., 1800 English Ave., Indianapolis, Ind.

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Frames

AND

Pressed Steel
Stampings

FOR AUTOMOBILES

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GASOLINE FUNNELS

ATLANTIC Stamping Co., Rochester, N. Y.

AUSTRO-AMERICAN Separator Co., 5710 Hough Ave., Cleveland, O. "Noshammy."

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.

HILL Dryer Co., Worcester, Mass.

NOSHAMMY—See Austro-American Separator Co.

TALIAFERRO, W. T., 258 Broadway, New York, N. Y.

VOGEL & Bros., Wm., 37 S. Ninth st., Brooklyn, N. Y.

WALLMAN Mfg. Co., 283-87 Fifth Ave., Milwaukee, Wis.

WILSON & Co., F. Cortez, 247 Lake St., Chicago, Ill.

GALVANIZING

BOSTON Galvanizing Works, 211 Commercial St., Boston, Mass.

BRIDGEPORT Electro Plating Co., 125 Kossuth St., Bridgeport, Conn.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J.
(See page 109.)

BUFFALO Galvanizing & Tinning Works, 49-53 Jackson St., Buffalo, N. Y.

CLEVELAND Galvanizing Works Co., 18-24 Cooper St., Cleveland, O.

DANA Mfg. Co., Cincinnati, O.

GALVANIZING Co., 525 N. Front St., Philadelphia, Pa.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

GRABLER Mfg. Co., Cleveland, Ohio.

INDIANA Galvanizing & Mfg. Co., Anderson, Ind.

MEAKER Co., 44 N. Elizabeth St., Chicago, Ill.

UNITED States Electro-Galvanizing Co., 1-9 Park Ave., Brooklyn, N. Y.

GAPS

SPARK GAPS

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. "Oscillum."
(See yellow insert.)

JACOBSON-BRANDOW Co., 86 North St., Pittsfield, Mass.

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y.
(See page 203.)

OSCILLUM—See Herz & Co.

GASKETS

METALLIC GASKETS

(For Asbestos, Composition or Rubber Gaskets—See Packing)

AKRON Metallic Gasket Co., Akron, O.

FITZGERALD Novelty Mfg. Co., P. T., 208 N. Elm St., Torrington, Conn.

GOODWIN & Kintz Co., Winsted, Conn.
(See page 65.)

GUILLOTT Metal Gasket Co., 97 S. Clinton St., Chicago, Ill.

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. (Importers.)
(See yellow insert.)

McCORD & Co., Detroit, Mich. "McKim."
(See page 423.)

McKIM—See McCord & Co.

SMOOTH-ON Mfg. Co., 572-74 Communipaw Ave., Jersey City, N. J.

UNITED States Indestructible Gasket Co., 16 So. William St., New York, N. Y.

UNITED States Mineral Wool Co., 140 Cedar St., New York, N. Y.

GATES

AUTOMATIC DRIVEWAY GATES

BYERLY—See International Fence & Fireproofing Co.

INTERNATIONAL Fence & Fireproofing Co., Columbus, O. "Byerly."

MANLOVE Gate Co., 272 E. Huron St., Chicago, Ill.

GAUGES

BATTERY GAUGES

(Pocket Battery Testers. For Standard Instruments —See Ammeters)

ADVANCE—See Eldredge Electric Mfg. Co.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Electrical Novelty & Mfg. Co., 308 Hudson St., New York, N. Y. "Ever Ready."

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 49.)

BAUMETZ—See Bean Son Co.

BEAN Son Co., Cleveland, O. "Baumetz."
(See page 63.)

CONNECTICUT Telephone & Electric Co., 45 Britannia St., Meriden, Conn.
(See page 101.)

DITTMAR—See Manhattan Electrical Supply Co.

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Largest Frame Plant
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BATTERY GAUGES (Continued)

DOW Portable Electric Co., Adams St., Braintree, Mass.

EISNER—See Gordon Auto Supply Co.

ELDREDGE Electric Mfg. Co., 7 Post Office Square, Springfield, Mass. "Advance."

ELITE—See Manhattan Electrical Supply Co.

EVER Ready—See American Electrical Novelty & Mfg. Co.

GOODSON Electric & Mfg. Co., Providence, R. I.
(See page 101.)

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass. "Eisner."
(See page 437.)

HOYT Electrical Instrument Works, Penacook, N. H.
(See page 401.)

KENT Mfg. Works, Atwater, 44 N. Sixth St., Philadelphia, Pa.
(See page 443.)

KEYSTONE Electrical Instrument Co., 9th St. & Montgomery Ave., Philadelphia, Pa.

MANHATTAN Electrical Supply Co., 17 Park Place, New York, N. Y. "Dittmar," "Elite."

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers).
(See page 37.)

NEVER-MISS Spark Plug Co., Lansing, Mich.
(See page 101.)

READRITE Meter Co., Bluffton, O.

READRITE—See Meter Co., Bluffton, O.

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

ROBERT Instrument Co., 49 Shelby St., Detroit, Mich.

STERLING Mfg. Co., American Trust Bldg., Cleveland, O.

WHITNEY Electrical Instrument Co., Concord, N. H.

BOILER WATER-LINE GAUGES

(For indicating height of water in steam boilers)

ASHTON Valve Co., 271 Franklin St., Boston, Mass.

JERGUSON Mfg. Co., 221 Columbus Ave., Boston, Mass. "Klinger."

KLINGER—See Jerguson Mfg. Co.

PENBERTHY Injector Co., 360 Holden Ave., Detroit, Mich.

RELIABLE Water Gauge Co., 1616 Pine St., St. Louis, Mo.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SEABURY—See Steam Automobile Appliance Co.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

STEAM Automobile Appliance Co., Denver Col. "Seabury."

CYLINDER COMPRESSION GAUGES

(For testing compression in gas engine cylinders)

A. B. C.—See Artizan Brass Co.

ARTIZAN Brass Co., 204 Lincoln Park Blvd., Chicago, Ill. "A. B. C."

AUTO Specialties Mfg. Co., 656-58 Third St., Milwaukee, Wis. "Foster," "Waite."

BROWN Co., 517 E. Water St., Syracuse, N. Y.

FOSTER—See Auto Specialties Mfg. Co.

STANDARD Auto Supply & Mfg. Co., 20 Broad St., New York, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

WAITE—See Auto Specialties Mfg. Co.

GASOLINE TANK GAUGES

(For indicating amount of gasoline in fuel tanks)

AUTO Pump Co., Springville, N. Y. "Spencer."

BOSTON Auto Gage Co., 12 Waltham St., Boston, Mass. "Triumph."
(See page opposite.)

CENTRAL Brass & Fixture Co., 118 W. North St., Springfield, O. "Puritan."

GILBERT & Barker Mfg. Co., Springfield, Mass. "Springfield."

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass.
(See page 437.)

HANCOCK, Mfg. Co., 770 Henry St. Charlotte, Mich.
(See page 423.)

HANKS Gasoline Meter Co., 381 West End Ave., New York, N. Y.

KINSEY Mfg. Co., Dayton, O. "Kinwood."
(See page 143.)

KINWOOD—See Kinsey Mfg. Co.

LAVIGNE Mfg. Co., 608 Commonwealth St., Detroit, Mich.

LIPMAN Mfg. Co., 210 Pleasant St., Beloit, Wis.

MURPHY'S—See Schaeffer & Budenberg Mfg. Co.

PACIFIC Gauge Co., Los Angeles, Cal.

PAGEL Co., W. G., Temple Court, Minneapolis, Minn. "Perfecto."

PERFECTO—See Pagel Co.

PURITAN—See Central Brass & Fixture Co.

RANDALL-FAICHNEY Co., Boston, Mass. "Webster."
(See page 141.)

ROSS—See Turner Brass Works.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y. "Murphy's."

SPENCER—See Auto Pump Co.

SPRINGFIELD—See Gilbert & Barker Mfg. Co.

TRIUMPH—See Boston Auto Gage Co.

TURNER Brass Works, Sycamore, Ill. "Ross."

WEBSTER—See Randall-Faichney Co.

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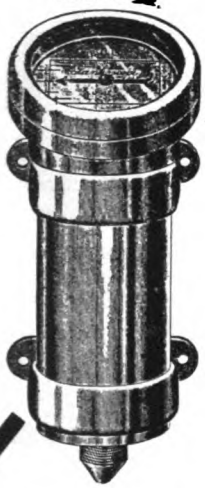
"TANKOSCOPE
Trade Mark



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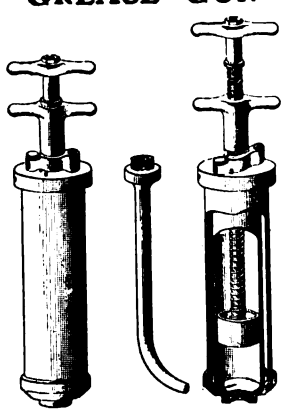

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ASHCROFT Mfg. Co., 87 Liberty St., New York, N. Y.

ASHTON Valve Co., 271 Franklin St., Boston, Mass.

BELFIELD & Co., H., 435 N. Broad St., Philadelphia, Pa.

CLEVELAND Steam Gauge Co., 1619 Merwin Ave., N. W., Cleveland, O.

CROSBY Steam Gage & Valve Co., 97 Oliver St., Boston, Mass.

MARSH & Co., Jas. P., 224 Washington St., Chicago, Ill.

PITTSBURG Gage & Supply Co., 309 Water St., Pittsburg, Pa.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

STAR Brass Mfg. Co., 108-14 E. Dedham St. Boston, Mass.

TIRE PRESSURE GAUGES

(For indicating pressure in tires—see also Valves, Tire Safety)

AUTO Specialties Mfg. Co., 656-58 Third St., Milwaukee, Wis.

BROWN Co., 517 E. Water St., Syracuse, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Washburn."

NATIONAL—See Wray Pump & Register Co.

STANDARD Auto Supply & Mfg. Co., 20 Broad St., New York, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

WASHBURN—See Judd & Leland Mfg. Co.

WRAY Pump & Register Co., 191-93 Mill St., Rochester, N. Y. "National."

WATER CIRCULATION GAUGES

(For indicating pressure in water cooling systems)

BROWN Co., 517 E. Water St., Syracuse, N. Y.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

GAUNTLETS

MOTORISTS' GAUNTLETS

(See Gloves, Motorists')

GEARS

BLANK GEARS

(See also Forgings; also Castings)

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich. (See page 307.)

BLAKESLEE Forging Co., Plantsville, Conn.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

DETROIT Screw Works, Detroit, Mich. (See page 483.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 119.)

FUNK Engineering Co., 39-45 14th St., Hoboken, N. J.

GILL & Sons Forge & Machine Works, P. H., 1 Lorraine St., Brooklyn, N. Y. (See page 319.)

HARTFORD Machine Screw Co., Hartford, Conn. (See page 481.)

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.) (See page 325.)

JOLIET Forge Co., Joliet, Ill. (See page 339.)

MEISEL Press & Mfg. Co., 944-48 Dorchester Ave., Boston, Mass. (See page 129.)

MICHIGAN Screw Co., Lansing, Mich.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

NEW PROCESS Steel Co., 210 W. River St., Marshall, Mich. (See page 131.)

OBENBERGER Co., John, 220 Lake St., Milwaukee, Wis.

REESE Machine & Tool Works, S., 324 W. Main St., Plymouth, Pa.

SCHWEPPE & Wilt, Congress & Sixth Sts., Detroit, Mich.

SIER-BATH Co., 145 W. 54th St., New York, N. Y. (See page opposite.)

SUNDBERG-KROPP & Co., 1121-31 W. 21st St., Chicago, Ill.

DIFFERENTIAL GEARS

BOSTON Gear Works, Norfolk Downs, Mass. (See page opposite.)

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y. (See page 129.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CULLMAN Wheel Co., 1020 Greenwood Terrace, Chicago, Ill. (See page 251.)

HEDGELAND Mfg. Co., Canton, O. (See page 359.)

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

LONG Arm System Co., Cleveland, O. (See page 93.)

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EXPERIENCE

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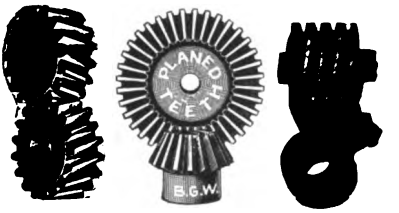

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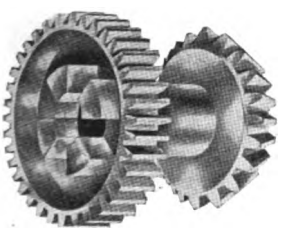

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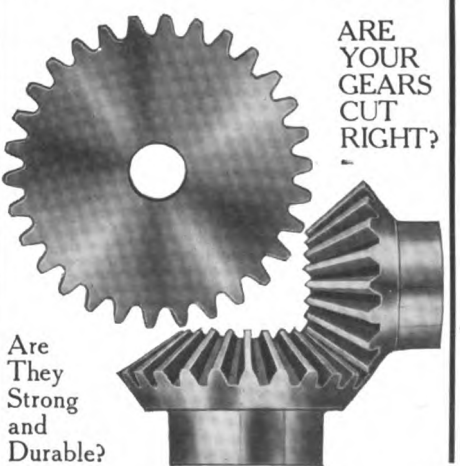

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GEARS (Continued)

DIFFERENTIAL GEARS (Continued)

ROSS Gear & Tool Co., Main & Ninth Sts., Lafayette, Ind.

WABASH Gear Works, 10th & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 133.)

WIDE RANGE—See High Wheel Auto Parts Co.

MARINE REVERSE GEARS

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

BALL—See New York Gear Works.

BRODIE, Wm. H., 45 Vesey St., N. Y. City.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

CONTINENTAL Motor Mfg. Co., Muskegon, Mich.
(See page 181.)

CROSS Engine Co., M. O., 800-06 Bellevue Ave., Detroit, Mich.

EUREKA Reverse Gear Co., 172 Pearl St., Hartford, Conn.

EVANS Stamping & Plating Co., Taunton, Mass. "Paragon."

GIES Gear Co., 345-47 Bellevue Ave., Detroit, Mich.

HARVARD Marine & Auto Co., 25 Eliot St., Cambridge, Mass. "Hub."

HAWLEY—See Power Improvement Co.

HOLLIDAY Mfg. & Engineering Co., 160 Bunker St., Chicago, Ill.

HUB—See Harvard Marine & Auto Co.

JOES—See Snow & Petrelli Mfg. Co.

JOHNSON Machine Co., Carlyle, 356 Asylum St., Hartford, Conn.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

NEW York Gear Works, 56 Greenpoint Ave., Brooklyn, N. Y. "Ball."
(See page opposite.)

PARAGON—See Evans Stamping & Plating Co.

POWER Improvement Co., Stratford, Conn. "Hawley."

SNOW & Petrelli Mfg. Co., 441 Chapel St., New Haven, Conn. "Joes."

STOWE Mfg. Co., Wilmington, Del.

TRIUMPH Gear Works, 226-28 Abbott St., Detroit, Mich.

RUNNING GEARS

BORBEIN Auto Co., 2107 N. Ninth St., St. Louis, Mo.

CARRICO Motor Co., Cincinnati, O.

ELWELL-PARKER Electric Co., 4225 St. Clair Ave., Cleveland, O.
(See page 19.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GARFORD Co., Elyria, O.

JONES Motor Co., Geo. H., Sixth & Erie Sts., Camden, N. J.

McCUE Co., Hartford, Conn.
(See page 93.)

NEUSTADT Auto & Supply Co., Olive St., St. Louis, Mo.
(See page 509.)

REEVES Pulley Co., Columbus, O.

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

STEERING GEARS

AMERICAN Gear & Mfg. Co., 205 W. South St., Indianapolis, Ind.

AUTO Parts Mfg. Co., Muncie, Ind. "B.T.K."

B.T.K.—See Auto Parts Mfg. Co.

BAKER Gear Co., Homer, N. Y.

BLOOD Bros. Machine Co., Ransom St. & S. Haven R. R., Kalamazoo, Mich.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 127.)

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y.
(See page opposite.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BULTMAN, Co., F. H., 2108 Superior Viaduct, Cleveland, O.

COLUMBUS Screw & Machine Co., 244-46 Kaiser St., Columbus, O.

COVERT—See Schweppe & Wilt.

ELYRIA Machine Parts Co., Elyria, Ohio.

GARFORD CO., Elyria, O.

GEMMER Mfg. Co., 741 Merrick Ave., Detroit, Mich.
(See page 133.)

HARTFORD Auto Parts Co., Hartford, Conn.
(See page 191.)

HINDLEY—See Morse, Williams & Co.

JOHNSON Service Co., 149-53 Michigan St., Milwaukee, Wis.
(See page 257.)

M & B—See Lavalette & Co.

MEISEL Press & Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.
(See page opposite.)

MILLER—See Scully Mfg. Co.

MORSE, Williams & Co., 12th & Sansom Sts., Philadelphia, Pa. "Hindley."

OHIO Brass Co., Mansfield, O.

ROTH Tool Co., B., 2122-28 Choteau Ave., St. Louis, Mo.

ROSS Gear & Tool Co., Main & Ninth Sts., Lafayette, Ind.

SCHWEPPE & Wilt, Congress & Sixth Sts., Detroit, Mich. "Covert."

SCULLY Mfg. Co., W. J., 171-91 Beecher Ave., Detroit, Mich. "Miller."

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

SOUTH Park Mfg. Co., Port Huron, Mich.

STOW Flexible Shaft Co., 26th & Callowhill Sts., Philadelphia, Pa.

Complete Index to Classification appears on Pages 7 to 18.

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Many Models and Sizes

BROWN-LIPE GEAR CO.

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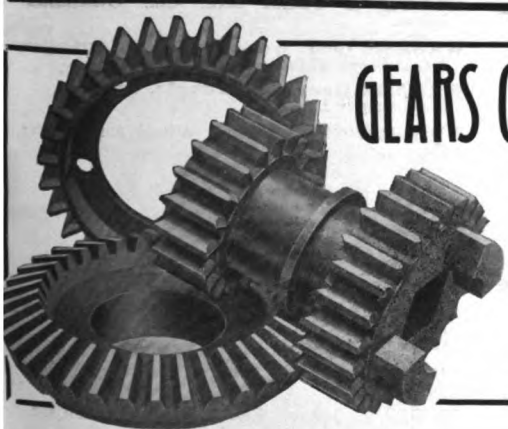

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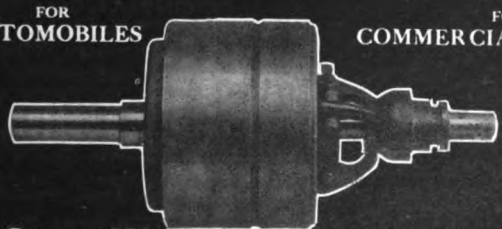

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GEARS (Continued)

STEERING GEARS (Continued)

WARNER Gear Co., Muncie, Ind.
(See page 133.)

TRANSMISSION GEARS

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

AMERICAN Die & Tool Co., Reading, Pa.

AUTO Parts Mfg. Co., Muncie, Ind. "B.T.K."

B.T.K.—See Auto Parts Mfg. Co.

BALL—See New York Gear Works.

BLACK Mfg. Co., Ft. Wayne, Ind. "Transo-Differential."

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y.
(See page 129.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

BULTMAN & Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CARRICO Motor Co., Cincinnati, O.

CONTINENTAL Engine Co., 501 Monon Bldg., Chicago, Ill.

CONTINENTAL Motor Mfg. Co., Muskegon, Mich.
(See page 181.)

COTTA, Chas., Rockford, Ill.

COVERT Motor Vehicle Co., Lockport, N. Y.

CURRIER, Gardner & Bullis, Coudersport, Pa.

ECLIPSE Machine Co., Elmira, N. Y.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GENERAL Manufacturing Co., Richmond & MacDonald Sts., Elkhart, Ind.

HASSLER—See Marion Motor Car Co.

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 499.)

LAUTH-JUERGENS Motor Car Co., 94-98 Rawson St., Chicago, Ill.

LAWSON Mfg. Co., Homestead, Pa.
(See page 417.)

LINDSAY & Co., T. J., 415-19 Massachusetts Ave., Indianapolis, Ind.

LONG Arm System Co., Cleveland, O.
(See page 93.)

M & B—See Lavalette & Co.

MANUFACTURERS' Equipment Co., 23 N. Jefferson St., Chicago, Ill.

MARION Motor Car Co., Indianapolis, Ind. "Hassler."

MEISEL Press & Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.
(See page 129.)

MERCHANT & Evans Co., Philadelphia, Pa.
(See page 327.)

MILWAUKEE Motor Co., 22d & Burleigh Sts., Milwaukee, Wis.

NEW Process Steel Co., 210 W. River St., Marshall, Mich.
(See page 253.)

NEW York Gear Works, 56 Greenpoint Ave., Brooklyn, N. Y. "Ball."
(See page 129.)

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.
(See page 183.)

PARKINSON Gear Co., Rensselaer, Ind.
(See page 129.)

REEVES Pulley Co., Columbus, Ind.

SEITZ Automobile & Transmission Co., Detroit, Mich.

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

SOUTH Park Mfg. Co., Port Huron, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 217.)

STURTEVANT Mill Co., Harrison Sq., Boston, Mass.

SYRACUSE Gear Co., Syracuse, N. Y.

TRANSO-DIFFERENTIAL—See Black Mfg. Co.

TRIUMPH Gear Works ,226-28 Abbott St., Detroit, Mich.

TROJAN Motor Ca., 809 Nelson St., Louisville, Ky.

VIRTUE & Pound Mfg. Co., Owatonna, Minn.

WABASH Gear Works, 10th & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 133.)

WIDE RANGE—See High Wheel Auto Parts Co.

METAL GEARS AND PINIONS

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.
(See page 221.)

ARTHUR Co., 188 Front St., New York, N. Y.

BILGRAM, Hugo, 1233 Spring Garden St., Philadelphia, Pa.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 127.)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CINCINNATI Gear Co., 118-22 Opera Pl., Cincinnati, O.

DAVIS, Rodney, Philadelphia, Pa.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

EAGLE Gear & Machine Co., 141 Oxford St., Philadelphia, Pa.

EARLE Gear & Machine Co., Wyoming & Stenton Aves., Philadelphia, Pa.

FELLOWS Gear Sharper Co., 24 Pearl St., Springfield, Vt.
(See page 453.)

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WE have one of the largest and best equipped plants in the country for turning out accurate gears of any kind and material, and in any quantity. Have 40 gear cutting machines including Fellows Gear Shapers, Brown & Sharpe and Gould & Eberhardt Rotary Cutters and 14 Gleason Generators for bevel work and 3 special hobbing machines for spirals, herring bone and helical gears. Our lathe equipment is in keeping and includes the best types of automatic screw machines and turret lathes taking stock through the spindle up to 4½" diameter. We have three large hardening furnaces fitted with a pyrometer system and are thoroughly familiar with the proper treatments of the special steels. And we have a reputation for the high quality of our work, which is second to none.

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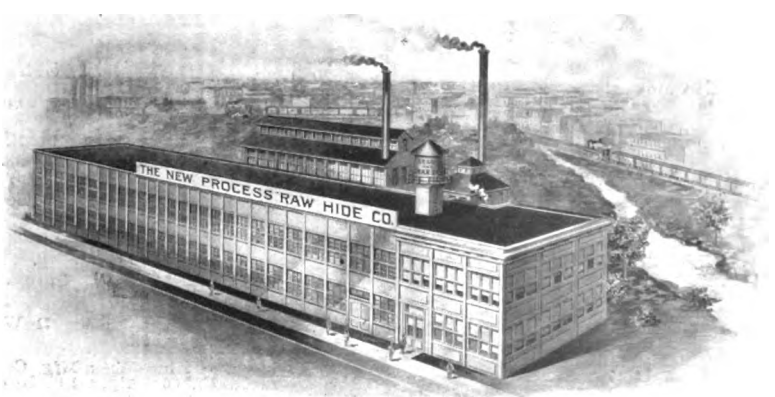

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GEARS (Continued)

METAL GEARS AND PINIONS (Continued)

FOOTE Bros. Gear & Machine Co., 44-50 N. Carpenter St., Chicago, Ill.

GANSCHOW Co., Wm., 270 W. Washington St., Chicago, Ill.

GLEASON Works, Rochester, N. Y.

GOULD & Eberhardt, N. J. R. R. Ave. & Green Sts., Newark, N. J.

GRANT Gear Works, 6 Portland St., Boston, Mass.

GRANT-LEES Machine Co., Cleveland, O. (See page 343.)

HINDLEY—See Morse, Williams & Co.

HORSBURGH & Scott Co., 5144 Hamilton Ave., Cleveland, O.

LONG Arm System Co., Cleveland, O. (See page 93.)

MEISEL Press & Mfg. Co., 944-48 Dorchester Ave., Boston, Mass. (See page 129.)

MORSE, Williams & Co., 12th & Sansom Sts., Philadelphia, Pa. "Hindley."

NEW ENGLAND Gear Works, 100 Purchase St., Boston, Mass. (See page 127.)

NEW Process Raw Hide Co., Syracuse, N. Y. (See page 131.)

NEWARK Gear Cutting Machine Co., 66-68 Union St., Newark, N. J.

NUTTALL Co., R. D., 925 Fayette St., Pittsburg, Pa.

PENNSYLVANIA Gear Works, 435 N. Broad St., Philadelphia, Pa. (See page 363.)

REESE Machine & Tool Works, S., 224 W. Main St., Plymouth, Pa.

ROSS Gear & Tool Co., Main & Ninth Sts., Lafayette, Ind.

SAWYER Gear Works, 227 St. Clair St., Cleveland, O.

SIER-BATH Co., 145 W. 54th St., New York, N. Y. (See page 127.)

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 217.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

THROOP Perforating Co., 80 Terrace, Buffalo, N. Y.

TURLEY, H. G., 212 Locust St., St. Louis, Mo.

VAN DORN & Dutton Co., 2714 E. 79th St., Cleveland, O.

VULCAN Gear Co., 820 Warren Ave. E., Detroit, Mich.

WABASH Gear Works, 10th & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind. (See page opposite.)

WIDMER Machine Works, Boydell Blk., Detroit, Mich. (See page 467.)

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

WORCESTER Gear Works, 81 E. Foster St., Worcester, Mass. (See page 127.)

YIELDABLE Gear Co., Springfield, O.

RAWHIDE GEARS AND PINIONS

BOSTON Gear Works, Norfolk Downs, Mass. (See page 127.)

CHICAGO Rawhide Mfg. Co., 75-77 Ohio St., Chicago, Ill.

EAGLE Gear & Machine Co., 141 Oxford St., Philadelphia, Pa.

GOULD & Eberhardt, N. J. R. R. Ave. & Green Sts., Newark, N. J.

HORSBURGH & Scott Co., 5144 Hamilton Ave., Cleveland, O.

MEISEL Press & Mfg. Co., 944-48 Dorchester Ave., Boston, Mass. (See page 129.)

NEW Process Raw Hide Co., Syracuse, N. Y. (See page 131.)

NON-SWELL—See Widmer Machine Works.

NUTTALL Co., R. D., 925 Fayette St., Pittsburg, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

PICROME Hide Co., Cor. N. Salina & Turtle Sts., Syracuse, N. Y. "Quride." (See page 411.)

QURIDE—See Picrome Hide Co.

SIER-BATH Co., 145 W. 54th St., New York, N. Y. (See page 127.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

WIDMER Machine Works, Boydell Blk., Detroit, Mich. "Non-Swell." (See page 467.)

GENERATORS

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ACETYVONE Co., Niagara Falls, N. Y.

AMERICAN Lamp Co., 125 Monroe Ave., Detroit, Mich.

ATWOOD-CASTLE Co., Amesbury, Mass.

BADGER Brass Mfg. Co., Kenosha, Wis "Solar."

BROWN Mfg. Co., John W., Columbus, O. (See page 159.)

CHICAGO Auto Lamp Works, 71 W. Jackson Blvd., Chicago, Ill.

COLUMBIA—See Hine-Watt Mfg. Co.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Handy."

ECO Mfg. Co., 53 State St., Boston, Mass.

EDMUNDS & Jones Mfg. Co., 317 Riopelle St., Detroit, Mich. (See page 157.)

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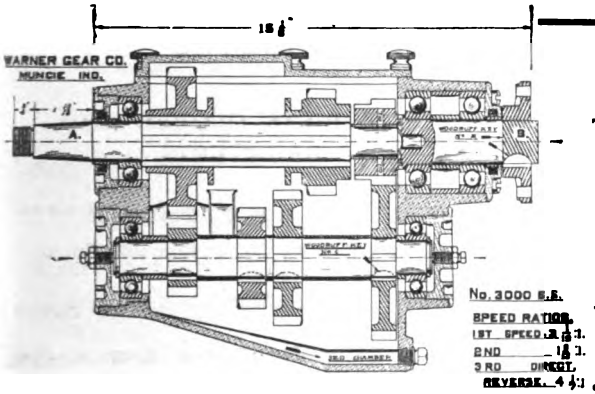

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AND STEERING GEARS
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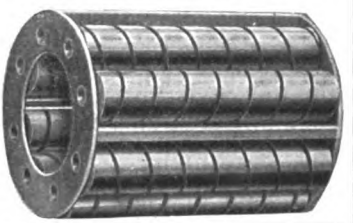

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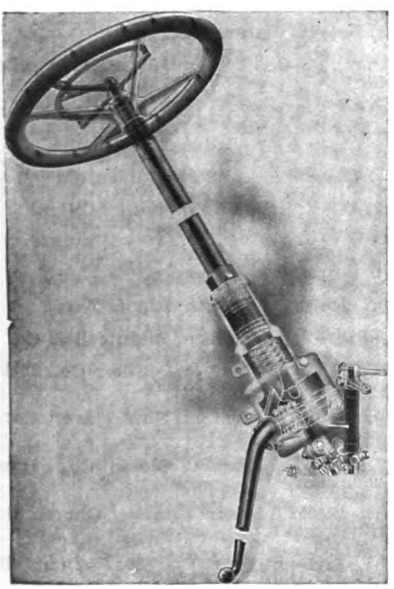

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GENERATORS (Continued)

ACETYLENE GAS GENERATORS (Continued)

FOWLER Lamp & Mfg. Co., 2333-37 Wabash Ave., Chicago, Ill.
(See page 455.)

GRAY & Davis, Amesbury, Mass.
(See page 493.)

GRAY & Sons, Peter, 88-90 Union St., Boston, Mass.

HANDY—See Dietz Co.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HINE-WATT Mfg. Co., 60 Wabash Ave., Chicago, Ill. "Columbia."

INTERNATIONAL Generator Co., Springfield, Mass.

MANHATTAN Brass Co., 328 E. 28th St., New York City.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. "Phoebus."
(See page 157.)

MILLER Mfg. Co., Peekskill, N. Y.

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

PETERSON Mfg. Co., O. W., 1256 Michigan Ave., Chicago, Ill.
(See page 471.)

PHOEBUS—See Manhattan Screw & Stamping Works.

PITTSBURGH Lamp, Brass & Glass Co., Pittsburgh, Pa.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J.
(See page 261.)

SAXON Lamp Co., 526-32 W. 28th St., New York, N. Y.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

SOLAR—See Badger Brass Mfg. Co.

TWENTIETH Century Mfg. Co., 17 Warren St., New York, N. Y.
(See page 255.)

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., 1249 Plum St., Cincinnati, O.

WESTBROOK—See Kimball Co.

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WIRE GLASS

(For use in Glass Fronts and Wind Shields)

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BELOIT Glove & Mitten Co., 217 Grand Ave., Beloit, Wis.

BOULEVARD—See Detroit Leather Specialty Co.

CHICAGO Auto Robe Supply Co., 155-59 Market St., Chicago, Ill.

CLARK Glove Co., Peabody, Mass.

CROSBY Frisian Fur Co., 116 Mill St., Rochester, N. Y.

DEERSKIN Glove Co., 4 Middle St., Gloversville, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich. "Boulevard."

EISENDRATH Glove Co., Armitage & Elston Ave., Chicago, Ill.

ELLSWORTH & Thayer Mfg. Co., 354 Broadway, Milwaukee, Wis. "Kantryp."

FREMONT Mitten & Glove Co., Fremont, O.

HANSEN, O. C., Mfg. Co., 356 E. Water St., Milwaukee, Wis.

HEAGLE, James, First Ave. & Market St., Johnstown, N. Y.

KANTRYP—See Ellsworth & Thayer Mfg. Co.

KIBBE, C. S., Batavia, N. Y.

MORAWETZ Co., 343 Broadway, Milwaukee, Wis.

MORRISON-RICKER Mfg. Co., 72 Broad St., Grinnell, Ia. "Rist-Fit."
(See page opposite.)

NEARKID—See Seamless Rubber Co.

PONTIAC Knitting Co., Pontiac, Mich.

PRICE Co., H. W., 114 Wyman St., Rockford, Ill.
(See page opposite.)

RIPON Knitting Works, Ripon, Wis.

RIST-FIT—See Morrison, McIntosh & Co.

SCANDINAVIAN Fur & Leather Co., 16 W. 33d St., New York, N. Y.

SEAMLESS Rubber Co., New Haven Conn. "Nearkid."

SOUTHERN California Glove Co., Hawthorne, Cal.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt.

STALL & Dean Mfg. Co., 23 Foundry St., Brockton, Mass.

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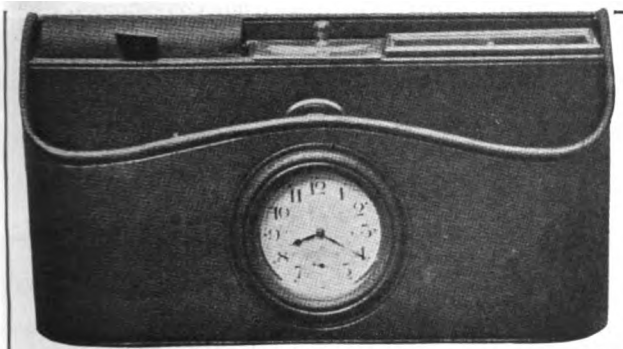

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168 South Ave., Rochester, N.Y.

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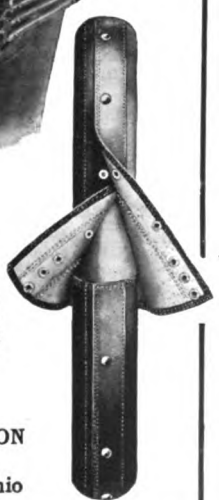
FITS NEAT AND SMOOTH. KEEPS TOP CLEAN



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are the auto gloves that are made from genuine, washable, horsehide leather —no cape, sheepskin or other inferior stock. In all styles, sizes and colors. Dressy and comfortable.

Write for "Price Automobile Glove" Catalogue showing the full line.

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AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers).

BAY State Goggle Co., 115 Walnut St., Malden, Mass. "Cee More."

CEE MORE—See Bay State Goggle Co.

CHICAGO Eye Shield Co., 142-45 S. Clinton St., Chicago, Ill.

CONSOLIDATED Optical Mfg. Co., 115-17 W. 129th St., New York, N. Y.

COVER, H. S., South Bend, Ind.

FRIEDLANDER & Bro., Joseph, 3 Maiden Lane, New York, N. Y.

GLOBE Optical Co., Boston, Mass.

KING Optical Co., Julius, 2 Maiden Lane, New York, N. Y.

LAMB Eye Shield Co., 33 Kingston St., Boston, Mass.

LLOYD & Co., A. J., 323 Washington St., Boston, Mass.

MEYROWITZ, E. B., 104 E. 23d St., New York, N. Y.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). (See page 179.)

MUNSELL & Co., Eugene, 213 Water St., New York, N. Y.

NORTH Carolina Mica Co., 95 Blackstone St., Boston, Mass.

OPTHALMUSCOPE Co., Toledo, O.

SCHEIDIG & Co., John, 50 Maiden Lane, New York, N. Y.

SEITZMAN Sons, I., 338 Bowery, New York, N. Y.

SPENCER Optical Mfg. Co., 31 Maiden Lane, New York, N. Y.

SUSSFIELD, Lorsch & Co., 39 Maiden Lane, New York, N. Y.

THXAS Co., 95 E. Kinzie St., Chicago, Ill.

GONGS

MECHANICAL GONGS

(See Bells, Mechanical)

GOVERNORS

AUTOMATIC SPEED CONTROL GOVERNORS

(For attachment to Speedometer for cutting out ignition at any desired speed)

JONES Speedometer Co., New Rochelle, N. Y.

GRAPHITE

LUBRICATING GRAPHITE

(For Graphite Grease—See Lubricants)

ACHESON Oildag Co., Niagara Falls, N. Y.

CARPENTER Co., Walter D., 39 Cortlandt St., New York, N. Y. "Graphilo."

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 313.)

GIRARD Graphite Co., Philadelphia, Pa.

GRAPHLIO—See Carpenter Co.

INTERNATIONAL Acheson Graphite Co., Niagara Falls, N. Y.

UNITED States Graphite Co., Saginaw, Mich.

WISCONSIN Graphite Co., Stevens Point, Wis.

GREASES

LUBRICATING GREASES

(See Lubricants)

GRIPS

THROTTLE AND SPARK LEVER GRIPS

STOKES Rubber Co., Jos., Trenton, N. J.

GUARDS

HORN BULB GUARDS

USONA Stamping Works, 199 Grand St., New York, N. Y.

MUD GUARDS AND FENDERS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

ACME Veneer Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page 53.)

AMESBURY Metal Body Co., Clark & Elm Sts., Amesbury, Mass.

AUTO Body Co., Lansing, Mich. (See page 59.)

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill. (See page 109.)

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BRIDGEPORT Vehicle Co., South Ave. & Water St., Bridgeport, Conn.

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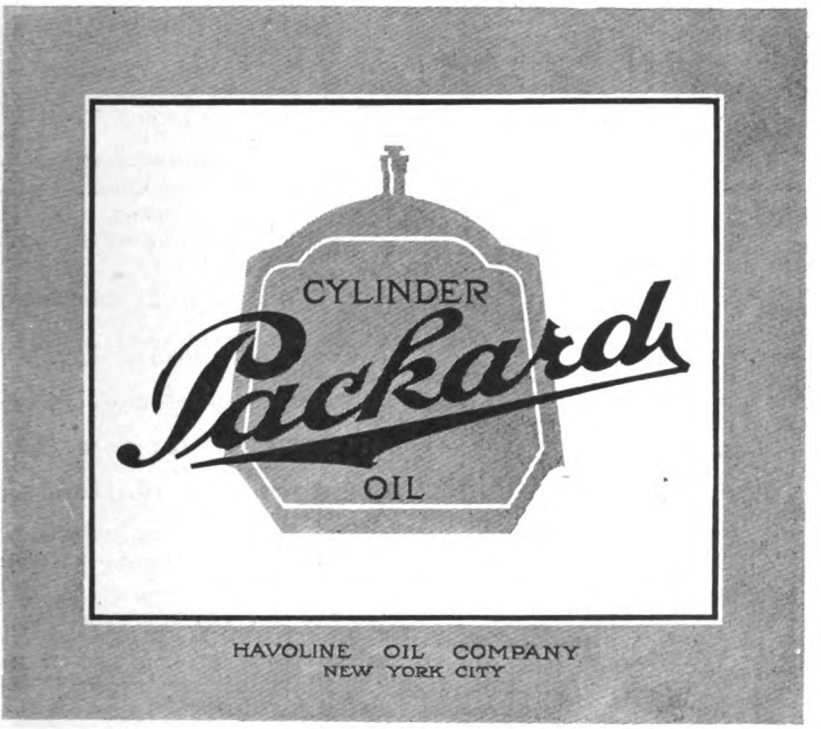
Special Announcement



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¶*They are the only Genuine Packard Oils.*

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GUARDS (Continued)

MUD GUARDS AND FENDERS (Continued)

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J.
(See page 109.)

BUSH Mfg. Co., 79 Commerce St., Hartford, Conn.
(See page 197.)

CLAYTON'S Sons, Frank B., 1222-24 Race St., Philadelphia, Pa.

COLE & Woop, 48 W. 67th St., New York, N. Y.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DETROIT Auto Specialty Co., 910 Greenwood Ave., Detroit, Mich.

FEDDERS Mfg. Works, Buffalo, N. Y.
(See page 485.)

FOLSOM Mfg. Co., C. G., 545 Scott St., South Bend, Ind.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.
(See page 423.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See page 455.)

INDIANAPOLIS Dash Co., 2116 S. Meridian St., Indianapolis, Ind.

KELLS Mfg. Co., W. J., 62-66 Van Winkle Ave., Jersey City, N. J.
(See page 147.)

KINSEY Mfg. Co., Dayton, O.
(See page 143.)

McKINNON Dash Co., Black Rock Station, Buffalo, N. Y.
(See page 107.)

MOORE & Munger Co., 602 W. 52d St., N. Y. City.

MULLINS Co., W. H., 124 Franklin St., Salem, O.

NEW York Dash & Fender Co., 516-20 W. 36th St., N. Y. City.

OFF & Co., Christian, 5 N. New Jersey St., Indianapolis, Ind.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

PETERS & Herron Dash Co., Gift & Culbertson Sts., Columbus, O.

QUINBY & Co., J. M., 21-39 Division St., Newark, N. J.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.
(See page 147.)

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 55.)

UNITED States Aluminum Co., Pittsburg, Pa.

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WRIGHT Cooler & Hood Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

GUNS

GREASE GUNS

(For forcing grease into gear cases)

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. "Autocrat."

AUTO Pump Co., Springville, N. Y. "Spencer."

AUTOCRAT—See American Thermo Ware Co.

BOSTON—See Randall-Faichney Co.

B-LINE—See Randall-Faichney Co.

DELTA Mfg. Co., Bloomfield, N. J.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.
(See page 423.)

GARAGE Equipment Co., Milwaukee, Wis. "Perfect."

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.
(See page 215.)

GREESEJAMMER—See Motor Car Supply Co.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Place."

KOKOMO Grease Gun Co., Kokomo, Ind.

MILLER & Starr, 250 Greene St., Brooklyn, N. Y.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers).
(See page 179.)

MOTOR Car Supply Co., 1425-27 Michigan Ave., Chicago, Ill. "Greesejammer."
(See page 465.)

NOERA Mfg. Co., Griggs St., Waterbury, Conn.

PERFECT—See Garage Equipment Co.

PIONEER—See Standard Sheet Metal Co.

PLACE—See Judd & Leland Mfg. Co.

RANDALL-FAICHNEY Co., Boston, Mass. "Boston," "B-Line."
(See page 141.)

RUBLY Specialty Mfg. Co., Tuckahoe, N. Y. "Tuckahoe."
(See page opposite.)

SPENCER—See Auto Pump Co.

STANDARD Sheet Metal Co., Delaware Ave., Passaic, N. J. "Pioneer."
(See page 213.)

TUCKAHOE—See Rubly Specialty Mfg. Co.

OIL GUNS

AUTO Pump Co., Springville, N. Y. "Spencer."

B-LINE—See Randall-Faichney Co.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

DELTA Mfg. Co., Bloomfield, N. J.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.
(See page 423.)

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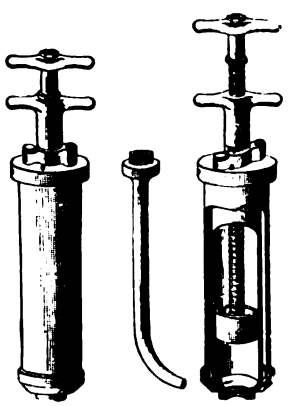
The Story Told in Pictures

Something New, Something Better
A Non-Mussy Grease Gun

Probably you've had to do with "grease guns" and likely enough your notion of "grease guns" is that they are a decidedly dirty proposition in the main. You are right—most any "grease gun" is a sloppy sort of thing, with the single exception of the

Tuckahoe Grease Gun



Now the Tuckahoe is wholly different from the others; it does, surely and positively, what the others claim to do, deliver grease to the spot, on the spot, in the spot, and it does so without covering the user with grease from the soles of his shoes to the back of his neck.

The Tuckahoe is a self-filler. Stick it into the grease can and it's filled ready to shoot onto or into the spot; it is clean; it is quick in operation; it is simple in construction; it won't get out of order; it is the real and only thing in "grease guns."

Dealers Should Get in Line

on the Tuckahoe Grease Gun. Just because the Tuckahoe with all its reliability and efficiency is a cinch to sell and the profit coming in from such sales is just about the nicest thing you could ever wish for. Ask us "how about it."

Write us to-day.

RUBLY MANUFACTURING CO., Tuckahoe, N. Y.

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GUNS (Continued)

OIL GUNS (Continued)

GARAGE Equipment Co., Milwaukee, Wis. "Perfect."

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y. (See page 215.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HASTINGS & Anderson, 116 Lake St., Chicago, Ill.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. (See page 157.)

MILLER Mfg. Co., Peekskill, N. Y. "Standard."

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). (See page 179.)

MOTOR Car Supply Co., 1425-27 Michigan Ave., Chicago, Ill. "Oiljammer." (See page 465.)

NEVER-MISS Spark Plug Co., Lansing, Mich. (See page 101.)

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

NOERA Mfg. Co., Griggs St., Waterbury, Conn.

OILJAMMER—See Motor Car Supply Co.

OSBORNE & Stephenson Mfg. Co., Plainville, Conn. (See page opposite.)

PERFECT—See Garage Equipment Co.

RANDALL-FAICHNEY Co., Boston, Mass. "B-Line." (See page opposite.)

RUBLY Specialty Mfg. Co., Tuckahoe, N. Y. "Tuckahoe." (See page 139.)

SPENCER—See Auto Pump Co.

STANDARD—See Miller Mfg. Co.

TUCKAHOE—See Rubly Specialty Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

UNIVERSAL—See New York Coach & Auto Lamp Co.

HAIR

CURLED HAIR

ARMOUR & Co., Chicago, Ill.

BAEDER, Adamson & Co., 67 Beekman St., New York, N. Y.

BENTLEY Hair Co., Joseph, Methuen, Mass.

GORDON BROS., Pierce & Orthodox Sts., Philadelphia, Pa.

MITCHELL Co., P. R., Spring Grove & Harrison Aves., Cincinnati, O.

WILKENS Co., Wm., Frederick Ave. & Wilkens St., Baltimore, Md

WOLL & Sons Mfg. Co., Peter, Hancock & Berks Sts., Philadelphia, Pa.

HAMPERS

TOURING HAMPERS, BASKETS AND LUNCH BOXES

(See also Trunks, Automobile)

BURLINGTON Basket Co., Burlington, Ia.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

M. & A. Basket Co., 239 E. 27th St., New York, N. Y.

SCHERER, Williams Co., 30 Lewis Wharf, Boston, Mass.

SEITZ, C., 607 Third Ave., New York, N. Y.

HANDLES

DOOR HANDLES

AUTO Rail & Equipment Co., 113 Michigan Trust Bldg., Grand Rapids, Mich.

COWLES & Co., C., New Haven, Conn. (See page 143.)

CURRY & Abeles, 229 Mulberry St., Newark N. J.

DOUGLAS & Lomason Co., 392 Grand River Ave., Detroit, Mich. (See page 63.)

ENGLISH & Mersick Co., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

JONAH & George, Merrimac, Mass.

METAL Stamping Co., 243-45 West St., New York, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass. (See page 233.)

NON-CORROSIVE Metal Co., Watertown, Mass. (See page 233.)

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STRONG, M. H., 168 South Ave., Rochester, N. Y. (See page 135.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page opposite.)

STARTING CRANK HANDLES

STOKES Rubber Co., Jos., Trenton, N. J.

HANGERS

LICENSE HANGERS

(See Numbers, License)

PRESSED STEEL STEP HANGERS

CROSBY Co., Buffalo, N. Y. (See page 249.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 119.)

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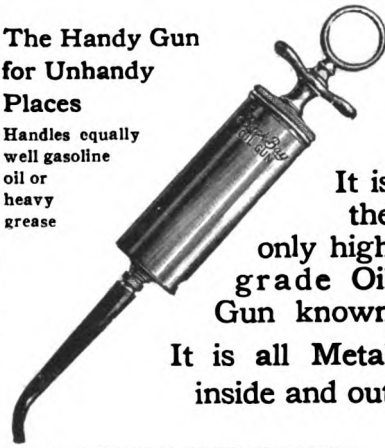
'B'-LINE OIL GREASE GUNS

The Handy Gun for Unhandy Places
Handles equally well gasoline oil or heavy grease



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IT OPERATES WITH ONE HAND
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(For Metal Foot Rests—See Rests, Foot)

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HEADLIGHTS

ACETYLENE HEADLIGHTS

(See Lamps, Acetylene)

ELECTRIC HEADLIGHTS

GILMORE Arc Headlight Co., 1592 N. Halsted St., Chicago, Ill.

O'BRIEN Electrophone Co., Hallowell, Me.

SUN Lamp Works, 505 Sunnyside Ave., Chicago, Ill.

HEATERS

AUTOMOBILE HEATERS

AUTO Rebuilding Co., 364 Wabash Ave., Chicago, Ill. (See page 353.)

BOYLE, B. Butler, 1133 Broadway, New York, N. Y. "Pele."

CHICAGO Flexible Shaft Co., La Salle Ave. & Ontario St., Chicago, Ill. "Clark."

CLARK—See Chicago Flexible Shaft Co.

ENSMINGER, Chas. C., Shelbyville, Ind.

LEHMAN Bros., 10 Bond St., New York, N. Y. "Star."

MOTOR Car Heater Co., 84 Adams St., Chicago, Ill.

NATIONAL CASKET Co., 264 Wabash Ave., Chicago, Ill.

OLMSTED & Son, H. R., 413 S. Clinton St., Syracuse, N. Y.

PELE—See Boyle, B. Butler.

PENCE Automobile Co., 717-19 Hennepin Ave., Minneapolis, Minn.

STANDARD Stamping Co., Marysville, O.

FEED WATER HEATERS

NATIONAL Pipe Bending Co., 110 River St., New Haven, Conn. (See page 327.)

OFELDT & Sons, F. W., Nyack-on-the-Hudson, N. Y.

RANLET Automobile Co., St. Johnsbury, Vt.

WHITLOCK Coil Pipe Co., Hartford, Conn.

HINGES

CABINET HINGES

ARCADE Mfg. Co., Freeport, Ill.

EAGLE Lock Co., Terryville, Conn.

HASSALL, John, 183 Lafayette St., New York, N. Y. (See page opposite.)

NORWALK Lock Co., S. Norwalk, Conn.

READING Hardware Co., Reading, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

SCOVILLE Mfg. Co., 99 Mill St., Waterbury, Conn.

STANLEY Works, Lake St., New Britain, Conn.

YALE & Towne Mfg. Co., 9 Murray St., New York, N. Y.

DOOR HINGES

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich. (See page 63.)

ENGLISH & Mersick Co., New Haven, Conn.

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

REINKE & Shirray Mfg. Co., 441-53 Lafayette Blvd., Detroit, Mich.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

HOOD HINGES

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

KINSEY Mfg. Co., Dayton, O. (See page opposite.)

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

WHITLOCK Coil Pipe Co., Hartford, Conn.

HOISTS

PORTABLE HOISTS

(See Cranes, Portable)

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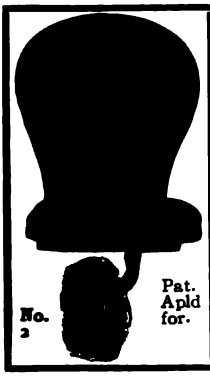

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HOLDERS

STARTING CRANK HOLDERS

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

HOLLIDAY - WYON Co., Indianapolis, Ind.
(See page 497.)

NATHAN Novelty Mfg. Co., 84-90 Reade St., New York, N. Y.
(See page 227.)

VAUGIER Mfg. Co., Wayne St. & P. R. R., Piqua, O.

TIRE HOLDERS

(For carrying spare tires on car)

A. B. C.—See Motor Car Supply Co.

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.
(See page 221.)

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALLEN Auto. Specialty Co., 1931 Broadway, New York, N. Y.

AMCO—See Appliance Mfg. Co.

APPLIANCE Mfg. Co., 60 W. Van Buren St., Chicago, Ill. "Amco."

ATLAS—See Manhattan Screw & Stamping Works.

AUTO Rail & Equipment Co., 113 Michigan Trust Bldg., Grand Rapids, Mich.

COWLES & Co., C., New Haven, Conn.
(See page 143.)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

ENGLISH & Mersick Co., New Haven, Conn.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill.
(See page 507.)

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill.
(See page 451.)

GARAGE Equipment Co., Milwaukee, Wis.

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

LANDON, John S., 200 N. Main St., Elkhart, Ind.

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J.
(See page 115.)

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. "Atlas."
(See page 157.)

MOTOR Car Supply Co., 1425-27 Michigan Ave., Chicago, Ill., "A. B. C."
(See page 465.)

NEW Jersey Aluminum Co., 701 Springfield Ave., Newark, N. J.

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

NONPAREIL Brass Co., 143 Summer St., Providence, R. I.
(See page 391.)

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

PHILADELPHIA Novelty Supply Co., 33d & Fontain Sts., Philadelphia, Pa.

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RILEY Bros., Bridgeton, N. J.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

SMITH Machine Co., H., 51 Goodwin St., Paterson, N. J.

SUTHERGREEN, F. S., Manchester, Mass.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VAN—See Vanderpool Bros.

VANDERPOOL Bros., 723 W. Mulberry St., Springfield, O. "Van."

WATCH HOLDERS

(See also Clocks, Dashboard)

COWLES & Co., C., New Haven, Conn.
(See page 143.)

ENGLISH & Mersick Co., New Haven, Conn.

KEYSTONE—See Rumpp & Sons.

RUMPP & Sons, C. F., Fifth & Cherry Sts., Philadelphia, Pa. "Keystone."

HOODS

MOTOR HOODS

A. H. & S. Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill.
(See page 109.)

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J.
(See page 109.)

BUSH Mfg. Co., 79 Commerce St., Hartford, Conn.
(See page 197.)

DETROIT Auto Specialty Co., 910 Greenwood Ave., Detroit, Mich.

FEDDERS Mfg. Works, Buffalo, N. Y.
(See page 485.)

FOLSOM Mfg. Co., C. G., 545 Scott St., South Bend, Ind.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See page 455.)

KELLS Mfg. Co., W. J., 62-66 Van Winkle Ave., Jersey City, N. J.
(See page 147.)

KINSEY Mfg. Co., Dayton, O. "Kinwood."
(See page 143.)

KINWOOD—See Kinsey Mfg. Co.

LONG Mfg. Co., 1430-34 Michigan Ave., Chicago, Ill.
(See page 147.)

MAYO Radiator Co., New Haven, Conn.
(See page opposite.)

MULLINS Co., W. H., 124 Franklin St., Salem, O.

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.

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If you want a Radiator that is sure to suit you, a radiator that is worth all it costs, a radiator that will make good in long service, get a **"MAYO."** The reputation of "Mayo" Radiators is well founded. The long and successful service on the best American built cars has established this beyond question. Nothing can be said or done that will detract from it. If you do not know the value of "Mayo" quality, ask one of your friends who have used "Mayo" Radiators, or ask us—we can satisfy you.

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MOTOR HOODS (Continued)

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OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173 St., New York, N. Y.
(See page opposite.)

ROME-TURNEY Radiator Co., Rome, N. Y.
(See page 99.)

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 55.)

UNITED States Aluminum Co., Pittsburg, Pa.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WRIGHT Cooler & Hood Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

HOOKS

SNAP HOOKS

COVERT Mfg. Co., Troy, N. Y.

EAST Bangor Mfg. Co., East Bangor, Pa.

METAL Stamping Co., 243-53 West St., New York, N. Y.

NORTH & Judd Mfg. Co, New Britain, Conn.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

HORNS

BULB HORNS

AUTOMOBILE Supply Mfg. Co., 139 Emerson Place, Brooklyn, N. Y. "Nonpareil."

BLANCHARD—See Motor Car Equipment Co.

ECHO—See Tripari Bros. & V. De Prisco Co.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y.
(See page 157.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). "Blanchard."
(See page 179.)

NONPAREIL—See Automobile Supply Mfg. Co.

OSBORNE & Stephenson Mfg. Co., Plainville, Conn.
(See page 141.)

POST & Lester Co., Hartford, Conn. (Importers). "Volier."
(See page 41.)

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

STANDARD Metal Mfg. Co., Chestnut, Jefferson & Malvern Sts., Newark, N. J.
(See page 441.)

TRIPARI Bros. & V. De Prisco Co., 372-74 Broome St., New York, N. Y. "Echo."

VOLIER—See Post & Lester Co.

ELECTRIC HORNS AND HORN BLOWERS

CRACK—See Smith & Son.

ELECTRO-CORNO—See Elkhart Dry Battery & Signal Co.

ELKHART Dry Battery & Signal Co., Commercial St., Elkhart, Ind. "Electro-Corno."

GARY Co., Theodore H., 50 Franklin St., New York, N. Y. "Grack-Unicum."
(See page 151.)

GRACK-UNICUM—See Gary Co.

KLAXON—See Lovell-McConnell Mfg. Co.

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J. "Klaxon."
(See page 115.)

O'BRIEN Electrophone Co., Hallowell, Me.

RUSSELL Electric Co., Danbury, Conn. "Treco."

SIRENO Co., 39-41 Cortlandt St., New York, N. Y.

SMITH & Son, S., 116 Broad St., New York, N. Y. (Importers.) "Crack."

TRECO—See Russell Electric Co.

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

EXHAUST HORNS

(Tube Horns or Chimes and Whistles)

AMCO—See Appliance Mfg. Co.

APPLIANCE Mfg. Co., 60 W. Van Buren St., Chicago, Ill. "Amco."

APOLLO—See Manhattan Screw & Stamping Works.

AUTOCHIME—See Gray-Hawley Mfg. Co.

B. & H.—See Peterson Co.

BARCO Brass & Joint Co., 56 N. Jefferson St., Chicago, Ill.

COMANCHE Whistle Co., 335 S. Spring St., Los Angeles, Cal.

ECHO Horn Co., 5601 Carnegie Ave., Cleveland, O.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GRAY-HAWLEY Mfg. Co., 608 W. Fort St., Detroit, Mich. "Autochime."
(See page 287.)

LABUIRE Import Co., 1964 Broadway, New York, N. Y. (Importers.) "Mener."

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. "Apollo."
(See page 157.)

MENER—See LaBuire Import Co.

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

Complete Index to Classification appears on Pages 7 to 18.

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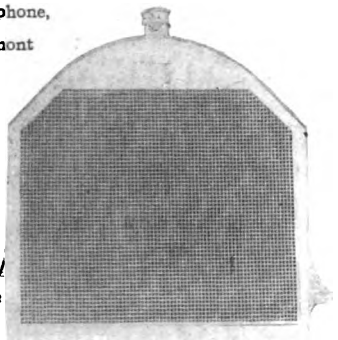

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Manufacturers of High Grade

Automobile Radiators

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METAL SEATS, FANS.

LONG DISTANCE

INSIST UPON A RADIATOR **EASILY REPAIRED**

LONG'S RADIATORS

are the only ones on the market that can be repaired when an accident is met with. Any broken tubes can be replaced with new ones at a small expense. Other makes of radiators when damaged must be entirely replaced at a heavy expense.

Send for Catalogue.

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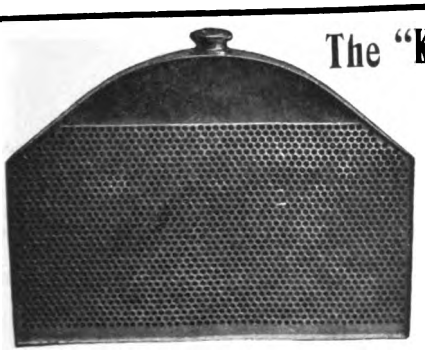

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Positively Guaranteed Not to Leak

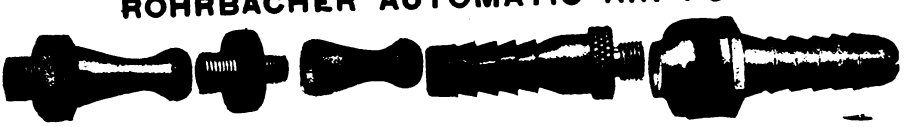
We are successfully cooling the following cars and have coolers in stock ready for immediate delivery: Lozier — Matheson — Simplex — Tincher — Gaeth—Grout—Peerless — Columbia—Mack Bros. Sightseeing Cars and Trucks — Packard — Pope-Toledo—Panhard — Cadillac, 4 cycle — Aster — Stevens-Duryea — Rochet-Schneider—Walters—E. W. Bliss Co.—Winton.

Get our estimates and prices.

W. J. Kells Manufacturing Co.
62-66 VAN WINKLE AVENUE
Telephone, 1272 Jersey JERSEY CITY, N. J.

A COMPLETE SET OF **AIR COUPLINGS** FOR USE IN CONJUNCTION WITH THE

ROHRBACHER AUTOMATIC AIR PUMP



No 1. AIR NOZZLE
Shows cut of Air Nozzle, used for cleaning and dusting cushions and inaccessible corners. Fits the Automatic Connection.

No. 2 NIPPLE AND NOZZLE
Shows cut of Nipple, which is manufactured to fit any valve

No 3 HOSE CONNECTOR
Shows cut of Hose Connector used for connecting hose to desired length by screwing on to the Automatic Connection.

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Shows cut of Automatic Connection, which, when connected with tire, automatically opens valve and allows the air to pass freely Unscrew, and the automatic valve connection closes, and also allows valve plug to close

WE MAKE SIX DIFFERENT KINDS OF AUTOMATIC AIR PUMPS FOR AUTOMOBILE AND GARAGE USE
Prices, etc., on application

ROHRBACHER AUTOMATIC AIR PUMP CO. **BLAINE, WASH.**

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HORNS (Continued)

EXHAUST HORNS (Continued)

NIGHTINGALE Whistle Mfg. Co., 1693 Broadway, New York, N. Y. (Importers.)
(See page opposite.)

PETERSON Co., T. J., Northwestern Blk., Chicago, Ill. "B. & H."

ROSS Engineering Co., 19 S. Jefferson St., Chicago, Ill.

SURPRISE Instrument Mfg. Co., 236 W. 54th St., New York, N. Y.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VAN—See Vanderpool Bros.

VANDERPOOL Bros., 723 W. Mulberry St., Springfield, O. "Van."

SIREN HORNS

LEAVITT—See Uncas Specialty Co.

SIRENO Co., 39-41 Cortlandt St., New York, N. Y.

UNCAS Specialty Co., 25 Shipping St., Norwich, Conn., "Leavitt."

HOSE

RUBBER HOSE

AKRON Rubber Co., Akron, O.

ANCHOR—See Mineralized Rubber Co.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

CLEVELAND—See Mechanical Rubber Co.

CLEVELAND Rubber Works, C. & P. R. R. junction of Nickel Plate R. R., Cleveland, O.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J.

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

CRESCENT Belting & Packing Co., Trenton, N. J.

DIAMOND Rubber Co., Akron, O.

GOODRICH Co., B. F., Akron, O.

GOTHAM Rubber Co., 45 South St., New York, N. Y.

GUTTA Percha & Rubber Mfg. Co., 126 Duane St., New York, N. Y.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HOME Tire Co., Trenton, N. J.
(See page 505.)

MANHATTAN Rubber Mfg. Co., 18 Vesey St., New York, N. Y.

MATTSON Rubber Co., Lodi, N. J.
(See page 151.)

MECHANICAL Rubber Co., C. & P. R. R. near Nickel Plate R. R., Cleveland, O. "Cleveland."

MERCER Rubber Co., Trenton, N. J.

MILFORD Rubber Works, Milford, Ill.

MINERALIZED Rubber Co., 18 Cliff St., New York, N. Y. "Anchor."

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

NEW York Rubber Co., 84 Reade St., New York, N. Y.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.
(See page 269.)

REVERE Rubber Co., 77 Bedford St., Boston, Mass.

STOKES Rubber Co., Jos., Trenton, N. J.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J.
(See page 45.)

UNITED & Globe Rubber Mfg. Co., Trenton, N. J.

VOORHEES Rubber Mfg. Co., Jersey City, N. J.

WATTS Sons, John M., 123 S. Second St., Philadelphia, Pa.

WHITEHEAD Bros. Rubber Co., Trenton, N. J.

HOUSES

PORTABLE HOUSES

ALADDIN—See North American Construction Co.

AMERICAN Portable House Co., Arcade Bldg., Seattle, Wash.

BURNHAM-STANDEFORD Co., Oakland, Cal.

CHESBRO-WHITMAN Co., First Ave. & 64th St., New York, N. Y.

CHICAGO Portable House Co., 4726 Shields Ave., Chicago, Ill.

CORNELL—See Wyckoff Lumber & Mfg. Co.

DUCKER Co., 277 Broadway, New York, N. Y.

EHRLICH, Geo., 85th St. & 18th Ave., Brooklyn, N. Y.

HODGSON, E. F., Dover, Mass. "Wigwarm."

HOLLIS, Park & Pollard, 28-30 Canal St., Boston, Mass.

KARR Portable House Co., W. Irving Park Blvd., Chicago, Ill.

KNAPP Portable-Permanent Building Co., 5 E. 42d St., New York, N. Y.

MERSHON & Morley Co., Saginaw, Mich.

NORTH American Construction Co., Bay City, Mich. "Aladdin."

PHENIX Mfg. Co., Center & Humboldt Sts., Milwaukee, Wis.

NIGHTINGALE WHISTLE

Demands Right of Way

ATTRACTIVE
MELODIOUS
PENETRATING

Guaranteed never to clog or require cleaning when properly attached

"THE SUPERLATIVE DEGREE OF PERFECTION"

Outfit complete $7.00 net, f. o. b. New York

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HOUSES (Continued)

PORTABLE HOUSES (Continued)

PORTABLE Construction Co., 16 S. William St., New York, N. Y.

RIVERSIDE Mfg. Co., 162 Riverside Ave., Newark, N. J.

RODGERS Co., J. S., Moorestown, N. J.

SPRINGFIELD Portable Construction Co., 58 Waltham Ave., Springfield, Mass.

WIGWARM—See Hodgson, E. F.

WYCKOFF Lumber & Mfg. Co., Ithaca, N. Y. "Cornell."

HUBS

WHEEL HUBS

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, Ohio.
(See page 43.)

JACKSON Drop Forging Co., Jackson, Mich.

JAMESVILLE Mfg. Co., Jamesville, N. Y.

McCUE Co., Hartford, Conn.
(See page 93.)

MOTT Wheel Works, Pleasant St., Utica, N. Y.

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

STANDARD Roller Bearing Co., Philadelphia, Pa.
(See page 445.)

TIMKEN Roller Bearing Axle Co., Canton, O.

WESTON-MOTT Co., Flint, Mich.
(See page opposite.)

HYDROMETERS

TESTING HYDROMETERS

(For testing Battery Electrolyte, Gasoline, etc.)

ALCO-METER—See Larchmont Mfg. Co.

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers).

HOEHN Co., R., 84-90 Evergreen Ave., Brooklyn, N. Y.

LARCHMONT Mfg. Co., Larchmont, N. Y. "Alco-Meter."

PENNELLI, P., 194 William St., New York, N. Y.

QUEEN & Co., Eighth & Arch Sts., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

STORAGE Battery Supply Co., 241 E. 27th St., New York, N. Y. "Three Ball."
(See page 473.)

TAYLOR Bros. Co., Rochester, N. Y.

THREE BALL—See Storage Battery Supply Co.

VUILLE, Chas. A., Huntington, Pa.

WATERTOWN Thermometer Co., Watertown, N. Y.

WEINHAGEN, H., 22-24 N. William St., New York, N. Y.

INDICATORS

TAIL LIGHT INDICATORS OR ALARMS

(To attach to an electric tail light to ring a bell or blow a whistle if the light goes out)

ROYAL Battery Co., 108 Duane St., New York, N. Y.

INFLATORS

TIRE INFLATORS

(See Pumps; also Tanks)

INJECTORS

BOILER FEEDING INJECTORS

CHURCHILL-LEE Co., 907-09 Michigan Ave., Detroit, Mich.
(See page 151.)

PENBERTHY Injector Co., 360 Holden Ave., Detroit, Mich.

GREASE INJECTORS

(See Guns, Grease)

INTENSIFIERS

SPARK INTENSIFIERS

(See Gaps, Spark)

IRONS

BODY OR TOP IRONS

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich.
(See page 307.)

BLAKESLEE Forging Co., Plantsville, Conn.

CLEVELAND Hardware Co., 45th St. & Lakeside Ave., Cleveland, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

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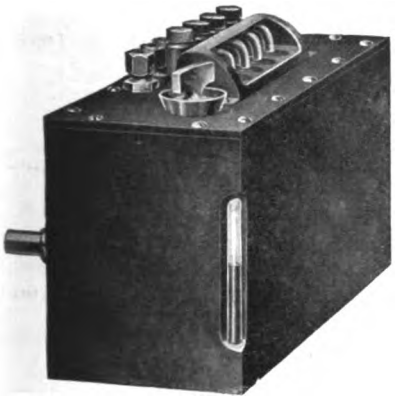
THE CHURCHILL MECHANICAL LUBRICATOR



Constructed without Cams, Cranks, Eccentrics, Springs, Valves or Moving Adjustable Parts.

Simplest in Construction and Operation and Longest Wearing Force Feed Oil Pump ever Constructed The Oil is forced to the bearings by means of a Very Unique Mechanical Motion, the Regulation being controlled in such a Way that the Adjustable Parts do Not move.

Manufactured by

THE CHURCHILL-LEE CO.
907-909 Michigan Ave., Detroit, Mich.

We Only Make

AUTOMOBILE AXLES HUBS AND RIMS

But make more than any other manufacturer in the world

Hubs BALL AND ROLLER BEARING

Axles FRONT AND REAR I-BEAM or TUBULAR

Bevel or Chain Driven

Doing this work as a specialty, with tools and equipment designed especially to the product made, gives us an advantage in cost of production that makes it possible to quote you interesting prices. May we?

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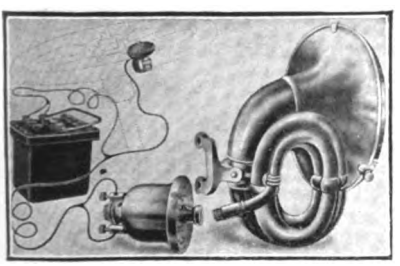

The Crack Unicum Electric Horn Attachment

is fast superseding the old fashioned, unreliable pneumatic horn.
The penetrating sound of the electric horn continues as long as you press the button.
You need not take your hand from the steering wheel in order to give warning.
There are no bulbs to break, no reeds to become clogged.
Made of best material, simple in construction, it is very durable. Easily installed. It requires very little current and will hardly affect the life of the sparking battery which furnishes the current.

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WRITE FOR 1909 PRICES ON

MATTSON TUBES AND CASES

RETREADING STOCKS, FRICTION FABRICS AND ALL RUBBER SUPPLIES FOR THE REPAIRMAN

WE MAKE A SPECIALTY OF THE MANUFACTURE OF RUBBER SUPPLIES OF EVERY DESCRIPTION USED IN THE AUTOMOBILE INDUSTRY.

OUR QUOTATIONS WILL PROVE INTERESTING

MATTSON RUBBER CO., LODI, N. J.

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IRONS (Continued)

SLAT IRONS

(See also Sockets, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

JONAH & George, Merrimac, Mass.

NON-CORROSIVE Metal Co., Watertown, Mass. (See page 233.)

PARRY & Co., A. N., Amesbury, Mass.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

TIRE IRONS

(See Tools, Tire)

JACKS

LIFTING JACKS

ASHMORE—See Kansas City Auto Jack Co.

ATLAS—See United States Jack Co.

BARRETT—See Duff Mfg. Co.

BARTH Mfg. Co., B St., Milwaukee, Wis. (See page opposite.)

BERGER Co., Joseph, 310-20 Hart St., Dayton, O.

BUCKEYE Jack Mfg. Co., Louisville, O.

BUDA Foundry & Mfg. Co., Chicago, Ill. (See page opposite.)

CHICAGO Steel Foundry Co., Chicago, Ill. (See pages 451 and 459.)

COOK'S Standard Tool Co., Kalamazoo, Mich. "Standard."

COVERT Mfg. Co., Watervliet, N. Y.

DELPAUCH—See Nightingale Whistle Mfg. Co.

DUFF Mfg. Co., Pittsburg, Pa. "Barrett."

ELITE Mfg. Co., Ashland, O. "Reliable." (See page opposite.)

EUREKA Mower Co., Utica, N. Y.

JERSEY Brake Co., 93 Green St., Newark N. J. "Searles."

JOYCE-CRIDLAND Co., Dayton, O. "XX Century."

KANSAS City Auto Jack Co., 714 Delaware St., Kansas City, Mo. "Ashmore."

LEADER—See Standard Tool Co.

LEATHER & Brass Mfg. Co., Auburn, N. Y.

LITTLE GIANT—See Miller Mfg. Co.

MILLER Mfg. Co., Peekskill, N. Y. "Little Giant."

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "Royal." (See page 179.)

NIGHTINGALE Whistle Mfg. Co., 1693 Broadway, New York, N. Y. (Importers). "Delpauch." (See page 149.)

NEW SAMPSON—See Oliver Mfg. Co.

OLIVER E. Z.—See Oliver Mfg. Co.

OLIVER Mfg. Co., 203 S. Desplaines St., Chicago, Ill. "Peerless," Oliver E. Z.", "New Sampson."

PATTERSON, Gottfried & Hunter, 146-150 Centre St., New York, N. Y.

PEERLESS—See Oliver Mfg. Co.

PIONEER Pole & Shaft Co., Piqua, O.

RELIABLE—See Elite Mfg. Co.

ROCKFORD Engineering Co., 320 Chestnut St., Rockford, Ill. "Sandow."

ROYAL—See Motor Car Equipment Co.

SANDOW—See Rockford Engineering Co.

SEARLES—See Jersey Brake Co.

SHAWVER Co., Springfield, O. "Springfield."

SMITH & Heminway, 108-10 Duane St., New York, N. Y.

SPRINGFIELD—See Shawver Co.

STANDARD—See Cooks Standard Tool Co.

STANDARD Tool Co., 432 Harrison St., Kalamazoo, Mich. "Leader."

UNION Elevator & Machine Co., 144-46 Ontario St., Chicago, Ill.

UNITED States Jack Co., 128-30 W. Lake St., Chicago, Ill. "Atlas."

VAN—See Vanderpool Bros.

VANDERPOOL BROS., 723 W. Mulberry St., Springfield, O. "Van."

XX CENTURY—See Joyce-Cridland Co.

SUPPORTING JACKS

(For holding car off the floor when not in use)

BICYCLE Step Ladder Co., 63 Randolph St., Chicago, Ill.

GARAGE Equipment Co., Milwaukee, Wis. "Little Giant."

GARLICK Auto Prop Co., Madison Ave. & Broadway, Paterson, N. J.

LITTLE GIANT—See Garage Equipment Co.

MOORE & Co., J. C., Racine, Wis.

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

SHAWVER Co., Springfield, O. "Springfield."

SPRINGFIELD—See Shawver Co.

JARS

RUBBER BATTERY JARS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

DIAMOND Rubber Co., Akron, O.

MORGAN & Wright, Detroit, Mich. (See page 271.)

STOKES Rubber Co., Jos., Trenton, N. J.

VULCANIZED Rubber Co., 488 Broadway, New York, N. Y.

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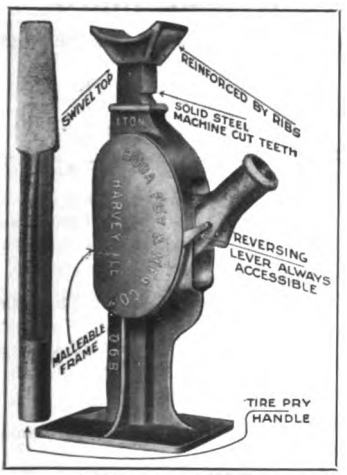

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Do you consider a good jack worth while? Many who once did not, now do. Experience has taught them that a cheap cast-iron jack is almost worthless no matter how low the cost. Buda 06B is a high grade jack at reasonable price.

Supply Dealers: Write for prices.

BUDA FOUNDRY & MFG. CO.

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ST. LOUIS: Fricso Building

All Leading Manufacturers

have selected the

RELIABLE JACK

for regular equipment with their 1909 models. A good jack is necessary equipment for every good car and the Reliable is the best you could select to go with ***your*** car. Not as high priced as a lot of poorer ones and there is none better at any price. Write us stating the weight of your car and the number you could use, and we will reply promptly with prices and discounts for quantities, and with literature showing the RELIABLE line and explaining why the Reliable is positively the best automobile jack made.

No. 1 Capacity 2 tons, List **$3.00**

No. 2 Capacity 5 tons List **$4.00** and four others.

THE ELITE MFG. CO., ASHLAND, O.

LISTEN AT THIS

WE MAKE AN AUTOMOBILE JACK GUARANTEED TO LIFT ANY CAR MADE

¶ It weighs 6 lbs., sells for $1.75 and gives the jobber and dealer a bigger profit than any jack on the market.

If it breaks down in use we'll replace or repair it **FREE**

IF INTERESTED WRITE QUICK FOR PROPOSITION TO THE
BARTH MFG. CO., B St., Milwaukee, Wis.

JOBBERS

SUPPLY JOBBERS

(This is a list of Jobbers and Dealers in Automobile Supplies who advertise in this publication)

AKRON Auto Supply Co., 391 S. Main St., Akron, O.
(See page 509.)

AUTO Accessories Mfg. Co., Detroit, Mich.
(See page 237.)

AUTOMOBILE Supply Co., 1331 Michigan Ave., Chicago, Ill.
(See page opposite.)

AUTOLIGHT & Motor Supply Co., 506 N. Broad St., Philadelphia, Pa.
(See page 45.)

BECKLEY-RALSTON Co., 80-84 Michigan Ave., Chicago, Ill.
(See page 267.)

BEHEN-FAUGHT Motor Car Equipment Co., 3961 Olive St., St. Louis, Mo.
(See page 259.)

BI-MOTOR Equipment Co., (The S-M Supplies Co.), 177 Portland St., Boston, Mass.
(See page 415.)

BUICK Co., Thos. D., 715 S. Saginaw St., Flint, Mich.
(See page 125.)

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill.
(See page 489.)

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass.
(See page 437.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y.
(See page 179.)

MOTOR Car Supply Co., 1425-27 Michigan Ave., Chicago, Ill.
(See page 465.)

NEUSTADT Auto & Supply Co., Olive St., St. Louis, Mo.
(See page 509.)

PHOENIX Auto Supply Co., 3932 Olive St., St. Louis, Mo.
(See page opposite.)

POST & Lester Co., Hartford, Conn.
(See page 41.)

STRANG Supply Co., Lewis, 1912 Broadway, New York, N. Y.
(See page 497.)

WAITE Auto Supply Co., 17 Dorrance St., Providence, R. I.
(See page 259.)

JOINTS

BALL JOINTS

(For spark and throttle connections)

MECHANICAL & Electrical Mfg. Co., 54 N. Desplaines St., Chicago, Ill.
(See page 265.)

PENINSULAR Milled Screw Co., 751 Bellevue Ave., Detroit, Mich.

UNIVERSAL JOINTS

ACME Universal Joint Co., Kalamazoo, Mich.

AUTO Parts Mfg. Co., Muncie, Ind. "B.T.K."

B.T.K.—See Auto Parts Mfg. Co.

BAUSCH Machine Tool Co., Springfield, Mass.

BLOOD Bros. Machine Co., Ransom St. & S. Haven R. R., Kalamazoo, Mich.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 127.)

COATES Clipper Mfg. Co., 237 Chandler St., Worcester, Mass.

FETZER Auto Mfg. Co., Galion, O.

GRAY & Prior Machine Co., 32 Suffield St., Hartford, Conn.
(See page 305.)

HARTFORD Auto Parts Co., Hartford, Conn.
(See page 191.)

JOHNSON Service Co., 149-53 Michigan St., Milwaukee, Wis.
(See page 257.)

K-B—See Kinsler-Bennett Co.

KINSLER-BENNETT Co., 62 Market St., Hartford, Conn. "K-B."

LEHMAN, I., 187 E. Second St., Cleveland, Ohio.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

MUTUAL Machine Co., 25 Wells St., Hartford, Conn. "Warrens."

SPICER Universal Joint Mfg. Co., 15 Madison Ave., Plainfield, N. J.
(See page 191.)

TRIUMPH Gear Works, 226-28 Abbott St., Detroit, Mich.

VANDERBEEK Tool Works, Laurel Ave., Hartford, Conn.

WARRENS—See Mutual Machine Co.

WIDMER Machine Works, Boydell Blk., Detroit, Mich.
(See page 467.)

KITS

TIRE REPAIR KITS

(See also Cement, Tire; also Patches, Tire; also Plugs, Tire; also Sleeves, Tire)

ARNSTEIN, Eugene, 35th St. & Shields Ave., Chicago, Ill.

AUTO Goods Co., 95 Milk St., Boston, Mass.

AUTO Time Saver Repair Kit Co., 144 High St., Boston, Mass.

CHANNON & Co., H., Market & Randolph Sts., Chicago, Ill.

CLINCH—See Goodrich Co.

EMPIRE Mfg. Co., Akron, O.

GOODRICH Co., B. F., Akron, O. "Clinch."

GOODYEAR Tire & Rubber Co., Akron, O.
(See page 199.)

M. & M. Mfg. Co., Akron, O.
(See page 38.)

TINGLEY & Co., Chas. O., Rahway, N. J.

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COACH LACE, WEBBING AND CORD

BRIDGEPORT Coach Lace Co., 865 Wood Ave., Bridgeport, Conn.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

VOGHT Mfg. & Coach Lace Co., 332-34 St Paul St., Rochester, N. Y.

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AMERICAN Electric Novelty & Mfg. Co., 396 Hudson St., New York, N. Y. "Ever Ready."

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco." (See page 49.)

CHICAGO Battery Co., Wabash Ave & 26th St., Chicago, Ill. "Duro." (See page 47.)

COWLES & Co., C., New Haven, Conn. (See page 143.)

DURO—See Chicago Battery Co.

EVER READY—See American Electric Novelty & Mfg. Co.

FOWLER Lamp & Mfg. Co., 2335 Wabash Ave., Chicago, Ill. (See page 455.)

NORTHWESTERN Storage Battery Co., Milwaukee, Wis.

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

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CONNECTICUT Telephone & Electric Co., 45 Britannia St., Meriden, Conn. (See page 101.)

COWLES & Co., C., New Haven, Conn. (See page 143.)

FOWLER Lamp & Mfg. Co., 2335 Wabash Ave., Chicago, Ill. (See page 455.)

FOX, D. G., 86 Washington St., Haverhill, Mass.

METAL Specialties Mfg. Co., 18-24 W. Randolph St., Chicago, Ill. "Presto."

MORSE, Frank W., 514-16 Atlantic Ave., Boston, Mass. (See page 375.)

NEW Idea Sales Co., Corning, N. Y.

PRESTO—See Metal Specialties Mfg. Co.

SHAIN, Chas. D., 70 Murray St., New York, N. Y. (See page 265.)

SHAWMUT—See Chase-Shawmut Co.

SYRACUSE Auto Supply Co., Syracuse, N. Y.

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico." (See page 205.)

ELECTRIC SIDE AND TAIL LAMPS

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco." (See page 49.)

ATWOOD-CASTLE Co., Amesbury, Mass.

CHICAGO Battery Co., Wabash Ave. & 26th St., Chicago, Ill. (See page 47.)

CLEVELAND Electrical Specialty Co., 724-28 Prospect Ave., Cleveland, O.

COWLES & Co., C., New Haven, Conn. (See page 143.)

DIETZ Co., R. E., 60 Laight St., New York, N. Y.

DURO—See Chicago Battery Co.

ENGLISH & Mersick Co., New Haven, Conn.

FOWLER Lamp & Mfg. Co., 2335 Wabash Ave., Chicago, Ill. (See page 455.)

GRAY & Davis, Amesbury, Mass. (See page 493.)

HOLT & Beebe, 40 Sudbury St., Boston, Mass.

NORTHWESTERN Storage Battery Co., Milwaukee, Wis.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

ACETYLENE GAS LAMPS

AMERICAN Lamp Co., 125 Monroe Ave., Detroit, Mich.

AMERICAN Lamp Works, 62 West 42d St., New York. "Liberty."

ATLAS—See New York Auto Lamp Co.

ATWOOD-CASTLE Co., Amesbury, Mass.

AUTO Accessories Mfg. Co., Detroit, Mich. "Sterling." (See page 237.)

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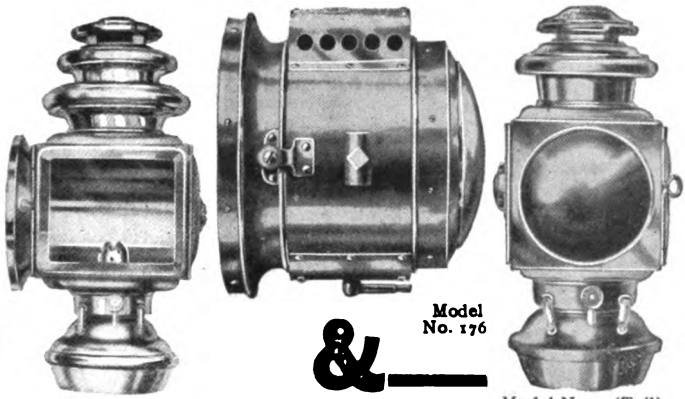

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AUTOMOBILE Supply Mfg. Co., 139 Emerson Place, Brooklyn, N. Y.

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

BROWN Mfg. Co., John W., Columbus, O. (See page 159.)

CHICAGO Auto Lamp Works, 71 W. Jackson Blvd., Chicago, Ill. "Diamond."

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O. (See page opposite.)

DAYTON Mfg. Co., 2240 E. Third St., Dayton, Ohio.

DIAMOND—See Chicago Auto Lamp Works.

DIETZ Co., R. E., 60 Laight St., New York, N. Y.

DU BOIS Searchlight Co., 220 Broadway New York, N. Y.

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 317 Riopelle St., Detroit, Mich. "E & J." (See page 157.)

ENGLISH & Mersick Co., New Haven, Conn.

FOWLER Lamp & Mfg. Co., 2335 Wabash Ave., Chicago, Ill. (See page 455.)

GRAY & Davis, Amesbury, Mass. (See page 493.)

GRAY & Sons, Peter, 88-90 Union St., Boston, Mass.

HINE-WATT Mfg. Co., 60 Wabash Ave., Chicago, Ill. "Columbia."

LIBERTY—See American Lamp Works.

MANHATTAN Brass Co., 328 E. 28th St., N. Y. City.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. "Phoebus." (See page 157.)

MILLER Mfg. Co., Peekskill, N. Y.

NEVEROUT—See Rose Mfg. Co.

NEW York Auto Lamp Co., 585 Washington St., New York, N. Y. "Atlas."

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

PHOEBUS—See Manhattan Screw & Stamping Works.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J. (See page 261.)

SAXON Lamp Co., 526-32 W. 28th St., New York, N. Y.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

SOLAR—See Badger Brass Mfg. Co.

STERLING—See Auto Accessories Mfg. Co.

TILMANN Co., E., 509-15 W. 56th St., New York, N. Y.

TWENTIETH Century Mfg. Co., 17 Warren St., New York, N. Y. (See page 255.)

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., 1249 Plum St., Cincinnati, O.

OIL LAMPS

AMERICAN Lamp Co., 125 Monroe Ave., Detroit, Mich.

ATWOOD-CASTLE Co., Amesbury, Mass. "Staylit."

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BROWN Mfg. Co., John W., Columbus, O. (See page opposite.)

CORCORAN Lamp Co., Reading Road, Cincinnati, O. (See page opposite.)

COWLES & Co., C., New Haven, Conn. (See page 143.)

DIETZ Co., R. E. 60 Laight St., New York, N. Y. "Regal."

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 317 Riopelle St., Detroit, Mich. "E & J." (See page 157.)

ENGLISH & Mersick Co., New Haven, Conn.

GRAY & Davis, Amesbury, Mass. (See page 493.)

HAM Mfg. Co., C. T., Rochester, N. Y. "Rochester," "Tourist." (See page opposite.)

LOCKWOOD Co., 34 Mechanic St., Newark, N. J.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. "Phoebus." (See page 157.)

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

PHOEBUS—See Manhattan Screw & Stamping Works.

REGAL—See Dietz Co.

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TOURIST—See Ham Mfg. Co.

TWENTIETH Century Mfg. Co., 17 Warren St., New York, N. Y. (See page 255.)

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., 1249 Plum St., Cincinnati, O.

WEDMAN & Co., J. C., 14-15 Kirby Ave., Detroit, Mich.

LAVA

AMERICAN Lava Co., Chattanooga, Tenn. (See page 67.)

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

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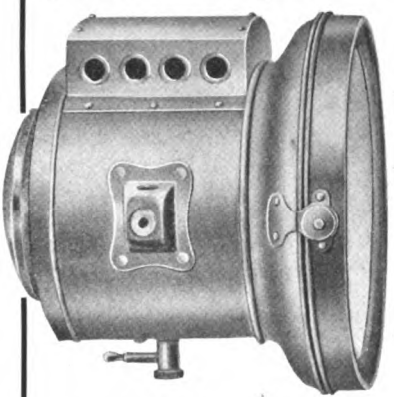

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CARR, F. S., 74 Pearl St., Boston, Mass. (Dealers)
(See page 505.)

CHASE Co., L. C., Boston, Mass (Dealers).
(See page 65.)

FABROKOID Co., Newburgh, N. Y.

MOROCCOLINE—See Boston Artificial Leather Co.

MUTTY Co., L. J., Boston, Mass. (Dealers).
(See page 279.)

O'BANNON Corp., 72 Duane St., New York, N. Y.
(See page opposite.)

PANTASOTE Co., 11 Broadway, New York, N. Y.
(See page opposite.)

FRICTION LEATHER

(For lining brakes and clutches. See also Banding, Brake; also Belting, Leather; also Fibre, Hard)

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass.
(See page 53.)

GRATON & Knight Mfg. Co., 94-104 Bloomingdale Rd., Worcester, Mass.
(See page 271.)

NEW YORK Leather Belting Co., 51 Beekman St., New York, N. Y.
(See page 53.)

RAHMAN & Co., Geo., 6 Ferry St., New York, N. Y.

REPUBLIC Belting & Supply Co., 1616 W. Third St., Cleveland, O.

SCHIEREN & Co., Chas. A., 30 Ferry St., New York, N. Y.

NATURAL LEATHER

AMERICAN Oak Leather Co., Cincinnati, O.

AMERICAN Patent Leather Co., 24 New York Ave., Newark, N. J.

ASHTABULA Hide & Leather Co., Ashtabula, Ohio.
(See page 471.)

ATLANTIC Leather Co., 173 Wright St., Newark, N. J.

BEAVER—See Straus & Sons, M.

BLANCHARD Bros. & Lane, 20 Bruen St., Newark, N. J.

CAFFREY Leather Co., M., Frelinghuysen Ave. & Meeker St., Newark, N. J.

CLEVELAND Tanning Co., Jennings & Dennison Aves., S. W., Cleveland, O.

DIEN, Ch., 43-45 W. 34th St., New York, N. Y. (Importer.) (Chrome leather for tires only.)

FIVE BROTHERS—See Klauder, Charles L.

HALSEY & Smith, J. H., Shipman & Springfield Aves., Newark, N. J.

HOWELL & Co., T. P., Newark, N. J.

HOWELL - HINCHMAN Co., Middletown, N. Y.

KLAUDER, Charles L., Allegheny Ave. & B St., Philadelphia, Pa. "Five Brothers."

LACKAWANNA Leather Co., Hackettstown, N. J.

McCORMICK & Sons, E. H., Ave. C & Vanderpool St., Newark, N. J.

RADEL Leather Mfg. Co., Hamburg Place Road, Newark, N. J.

RASER Tanning Co., Ashtabula, O.

REILLY, John, 40 Ave. C., Newark, N. J.

REILLY & Son Corp., P., Newark, N. J.

REX Imperial Leather Co., 12-28 Chapel St., Newark, N. J.
(See page 257.)

RUTTER & Turner, 32 Spruce St., New York, N. Y.

SMITH Co., Hugh, 210 Central Ave., Newark, N. J.

STANDARD Leather Co., 296 Spring Garden Ave., Allegheny, Pa.

STENGEL, Geo., Frelinghuysen & Elizabeth Aves., Newark, N. J.

STENGEL & Rothschild, Kossuth & Berlin St., Newark, N. J.

STRAUS & Sons, M., Frelinghuysen Ave., Newark, N. J. "Beaver."

TERWILLIGER-STONE Leather Co., 210 N. J. R. R. Ave., Newark, N. J.

WARD & Co., E. S., Waverly, Newark, N. J.

RAWHIDE LACE LEATHER

(For preventing motor hoods or bonnets from rattling)

AKRON Belting Co., Akron, O.

CHICAGO Rawhide Mfg. Co., 75-77 E. Ohio St., Chicago, Ill.

GAY, Fred E., Pawtucket, R. I.

GRATON & Knight Mfg. Co., 94-104 Bloomingdale Rd., Worcester, Mass.
(See page 271.)

KELTON-BRUCE Mfg. Co., Salem, Mass.

MISSOURI Belting Co., St. Louis, Mo.

NATIONAL Rawhide & Belting Co., Niles, Mich.

NEW YORK Leather Belting Co., 51 Beekman St., New York, N. Y.
(See page 53.)

NORWICH Belt Mfg. Co., Norwich, Conn.

RAHMAN & Co., Geo., 6 Ferry St., New York, N. Y.

SHULTZ Belting Co., 402 Bartow St., St. Louis, Mo.

WEATHERHEAD, Thompson & Co., Pawtucket, R. I.

WILLIAMS & Sons, I. B., Dover, N. H.

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COOK & Bro., E. C., 49 E. Kinzie St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn. (See page 265.)

VEHICLE Apron & Hood Co., Columbus, O. (See page 135.)

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn.

LEVERS

BRAKE AND GEAR SHIFT LEVERS

(Finished or Machined Levers. For levers in the rough—See Castings, also Forgings)

AMERICAN & British Mfg. Co., Bridgeport, Conn.

AUTO Parts Mfg. Co., Muncie, Ind. "B. T. K."

B. T. K.—See Auto Parts Mfg. Co.

BERRY, Chas. W., Gray, Me.

CENTURY Specialty Co., 1079 S. Bruck St., Columbus, O.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 119.)

LONG Arm System Co., Cleveland, O. (See page 93.)

McCUE Co., Hartford, Conn. (See page 93.)

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis. (See page 123.)

WABASH Gear Works, 10th & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind. (See page 133.)

WIDE RANGE—See High Wheel Auto Parts Co.

LIGHTERS

ACETYLENE LAMP LIGHTERS

(For lighting headlights from the seat by electricity)

ADJUSTABLE Light Co., 18 Pearl St., Newton, Mass.

ELECTRIC Goods Mfg. Co., 115 Purchase St., Boston, Mass. "Gem," "Jewel."

GEM—See Electric Goods Mfg. Co.

JEWEL—See Electric Goods Mfg. Co.

PINKUS, Frederick B., 103 Franklin St., N. Y. City.

SMI-CO Mfg. Co., Easton, Pa.

ELECTRIC CIGAR LIGHTERS

BESSELECTRIC Lighter Co., Scranton, Pa.

COWLES & Co., C., New Haven, Conn. (See page 143.)

METAL Specialties Mfg. Co., 18-24 W. Randolph St., Chicago, Ill. "Presto."

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). (See page 179.)

PRESTO—See Metal Specialties Mfg. Co.

OIL LAMP LIGHTERS

FOWLER Lamp & Mfg. Co., 2333-37 Wabash Ave., Chicago, Ill. (See page 455.)

LIGHTS

ELECTRIC DOME LIGHTS

COWLES & Co., C., New Haven, Conn. (See page 143.)

ENGLISH & Mersick Co., New Haven, Conn

FOWLER Lamp & Mfg. Co., 2335 Wabash Ave., Chicago, Ill. (See page 455.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). (See page 179.)

PARRY & Co., A. N., Amesbury, Mass.

STORAGE Battery Supply Co., 241 E. 27th St., New York, N. Y. (See page 473.)

VESTA Accumulator Co., 1336 Michigan Ave., Chicago, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

ELECTRIC GAUGE LIGHTS

(See Lamps, Electric Dash)

ELECTRIC HEADLIGHTS

(See Headlights, Electric).

LINING

BRAKE LINING

(See Banding, Brake; also Leather, Friction; also Fibre, Hard)

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FARR & Bailey Mfg. Co., Camden, N. J.

NAIRN Linoleum Co., Kearney, N. J.

NATIONAL Linoleum Co., Trenton N. J.

POTTER, Sons & Co., 522 Arch St., Philadelphia, Pa.

TRENTON Oil Cloth & Linoleum Co., Trenton, N. J.

WESTERN Linoleum Co., Akron, O.

LOCKERS

METAL CLOTHES LOCKERS

ART Metal Construction Co., Jamestown, N. Y.

BUFFALO Wire Works Co., 316-20 Terrace, Buffalo, N. Y.

CLARK Co., W. J., 161 Depot St., Salem, O.

CONNECTICUT Steel & Wire Co., 55-61 Allyn St., Hartford, Conn.

CYL-MEE-CO—See Manufacturing Equipment & Engineering Co.

DARBY & Sons Co., Edward, 218 Arch St., Philadelphia, Pa. (See page 349.)

DURAND Steel Locker Co., 125 Monroe St., Chicago, Ill.

FEDERAL Steel Fixture Co., 493-501 W. Kinzee St., Chicago, Ill.

GENERAL Fireproofing Co., Youngstown, O.

HART & Cooley Co., New Britain, Conn.

LYON Metallic Mfg. Co., Aurora, Ill.

MANUFACTURING Equipment & Engineering Co., 209 Washington St., Boston, Mass. "Cyl-Mee-Co."

MERRITT Co., Front & Arch Sts., Camden, N. J.

SMITH Wire & Iron Works, F. P., 100-02 Lake St., Chicago, Ill.

TERRELL'S Equipment Co., Victoria & Will Sts., Grand Rapids, Mich.

WRIGHT Wire Co., Worcester, Mass.

LOCKS

CABINET LOCKS

CORBIN Cabinet Lock Co., New Britain, Conn.

EAGLE Lock Co., Terryville, Conn.

PRICE Mfg. Co., W. R., 945 Sunnyside Ave., Chicago, Ill.

READING Hardware Co., Reading, Pa.

ROCHESTER Safety Lock Co., 530 Main St., Rochester, Ind.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

YALE & Towne Mfg. Co., 9 Murray St., New York, N. Y.

DOOR LOCKS

COWLES & Co., C., New Haven, Conn. (See page 143.)

ENGLISH & Mersick Co., New Haven, Conn.

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

REINKE & Shirray Mfg. Co., 441-53 Lafayette Blvd., Detroit, Mich.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

LOOPS

BRASS SNAP AND STRAP LOOPS

(See also Fittings, Top)

COWLES & Co., C., New Haven, Conn. (See page 143.)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

GLOBE Brass Works, 15-17 Macomb St., Detroit, Mich.

METAL Stamping Co., 243-45 West St., New York, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass. (See page 233.)

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

LUBRICANTS

OILS AND GREASES

ACME—See National Refining Co.

ACME Oil & Supply Co., 345 S. Canal St., Chicago, Ill.

ACORN—See Oakes, Fred T.

ALBANY—See Cooks Sons.

AMALIE—See Sonneborn Sons.

AMERICAN Oil Co., Jackson, Mich. "Amoco," "Paris." (See page 383.)

AMERICAN Oil & Disinfectant Co., 262 Pearl St., New York, N. Y. "Sparrow."

AMOCO—See American Oil Co.

ATLAS Oil & Grease Co., 1931 Broadway, New York, N. Y.

AURORA—See Pigot, Sayre & Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Red Cross."

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116 Broad Street NEW YORK

MONOGRAM OIL is sold at all garages

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LUBRICANTS (Continued)

OILS AND GREASES (Continued)

AUTOBY—See Great Western Oil Co.

AUTOIL—See New York Lubricating Oil Co.

AUTOLINE—See Robinson & Sons Co.

BADGERS—See Wadhams Oil Co.

BAKER, Wm. T., 228-32 Suydam Ave., Jersey City, N. J. "Everite," "Paramount."

BANNER—See Cortland Specialty Co.

BAUM'S Castorine Co., Rome, N. Y.

BELDEN & Co., A. G., 145 Maiden Lane, New York, N. Y.

BESLY & Co., C. H., 15-21 S. Clinton St., Chicago, Ill. "Helmet."

BLIVEN & Carrington, 116 Broad St., New York, N. Y.

BORNE-SCRYMSER Co., 80 South St., New York, N. Y. "Colonial," "Silex."
(See page 169.)

CENTAUR—See Fiske Bros. Refining Co.

CHAMPION Oil Co., 39th St. & Lowe Ave., Chicago, Ill.

CHESTERTON & Co., A. W., 64 India St., Boston, Mass.

CHILDS Co., G. B., 499 Greenwich St., New York, N. Y.

CLIMAX—See Sweet, Charles F.

CLIMAX-SYNOVIA—See Fiske Bros. Refining Co.

COLONIAL—See Borne-Scrymser Co.

COLGAN Mfg. & Supply Co., 42 South St., New York, N. Y.

COLUMBIA Lubricants Co. of New York, 116 Broad St., New York, N. Y. "Monogram."
(See page 165.)

COOKS Sons, Adam, 313 West St., New York, N. Y. "Albany."
(See page 163.)

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

CURRY Oil & Supply Co., Boston, Mass.

DEARBORN Drug & Chemical Works, Chicago, Ill.

DIXON Crucible Co., Jos., Jersey City, N. J.
(See page 313.)

DRAKE—See Oil City Oil & Grease Co.

DRAPER Co., Walter H., 120 South Railroad Ave., Mount Vernon, N. Y.

DUFFY Grease Co., 520 W. 40th St., New York, N. Y.
(See page 163.)

EAGLE Oil & Supply Co., 104 Broad St., Boston, Mass.

ELECTRIC—See Reliance Oil & Grease Co.

ELLIS & Cummings' Oil Works, foot of Chestnut St., Reading, Pa.

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

EVERITE—See Baker, Wm. T.

EXCELSIOR—See Miller's Sons.

FIDELITY Oil Co., 600-02 W. Sixth St., Kansas City, Mo.

FISKE Bros. Refining Co., 13-15 Old Slip, New York, N. Y. "Lubroleine," "Climax-Synovia," "Centaur."

FRANKLIN Oil Refining Co., 306 N. Commercial St., St. Louis, Mo.

GALLAWAY, G. W., 322 Pearl St., New York.

GOLD MEDAL—See Monarch Mfg. Co.

GOSSLER Oil Co., Allentown, Pa.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O. "Autoby," "Nokarbo."

GREENSLADE Oil Co., 40 Jefferson Ave., Detroit, Mich. "Packard 24-30."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I.
(See back cover.)

HAVOLINE Oil Co., 78 Broad St., New York, N. Y. "Packard."
(See page 137.)

HAWS, George A., 80 Pine St., N. Y. City. "Panhard."
(See page opposite.)

HELMET—See Besly & Co.

HERCULES—See Musliner & Co.

HOFFMAN Lubricating Oil Co., Binghamton, N. Y.

ILSLEY-DOUBLEDAY & Co., 229-31 Front St., New York, N. Y.

INVADER—See Kellom & Co.

KANTER Co., R. J., 647 Water St., New York, N. Y.
(See page 163.)

KELLOGG & Co., E. H., 243-44 South St., New York, N. Y.

KELLOM & Co., Chas. F., 113 Arch St., Philadelphia, Pa. "Invader."
(See page 381.)

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KEYSTONE Lubricating Co., Philadelphia, Pa.
(See page 487.)

KEYSTONE Refining Co., Columbus, O.
(See page 385.)

KIRKPATRICK, L. B., 233 Alexander St., Rochester, N. Y. "Kirks."

KIRKS—See Kirkpatrick, L. B.

LUBROLEINE—See Fiske Bros. Refining Co.

M-C—See Mound City Oil & Supply Co.

MACLEAN-BRANDOM Oil & Supply Co., 65 Long Wharf, Boston, Mass.

MARSHALL Oil Co., Marshalltown, Ia.
(See page 471.)

MERCEDES—See Sweet, Charles F.

MICAFLAKE—See United States Mica Co.

MILLER Co., Wm. P., 244-50 Greene St., Brooklyn, N. Y.

MILLER'S Sons, Wm. P., Nott Ave. & Hancock St., Long Island City, N. Y. "Excelsior." "Pan-O-Lite."
(See page 381.)

MIN-CARB—See Royal Lubricating Oil Co.

MOBILOIL—See Vacuum Oil Co.

MODOC Co., Foot of Market St., Chester, Pa.

MONARCH Mfg. Co., Toledo, O. "Gold Medal."

MONOGRAM—See Columbia Lubricants Co.

MOTORLUBE—See Tygert Co.

MOUND City Oil & Supply Co., 202 N. Commercial St., St. Louis, Mo. "M-C."

MUSLINER & Co., Jos., 156 Maiden Lane, New York, N. Y. "Hercules," "Solidoyl."

NATIONAL—See Reliance Oil & Grease Co.

Complete Index to Classification appears on Pages 7 to 18.

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Our booklet, "Lubrication," gives a lot of useful information on cylinder oil. We will send you a complimentary copy upon request.

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80 Pine St. **NEW YORK**

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LUBRICANTS (Continued)

OILS AND GREASES (Continued)

NATIONAL Oil & Supply Co., Essex & First Sts., Harrison, N. J. "Viscos."

NATIONAL Refining Co., 1036 Rose Bldg., Cleveland, O. "Acme." "Phoenix." "Royal."

NEW York & New Jersey Lubricant Co., 15 Church St., New York, N. Y.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Autoil."

NOKARBO—See Great Western Oil Co.

NORTHROP Lubricating Oil Co., 308 N. Commercial St., St. Louis, Mo.

NYE, Wm. F., New Bedford, Mass. "Whale."

OAKES, Fred T., 150 Nassau St., New York, N. Y. "Acorn."

OIL City Oil & Grease Co., Spring St., Oil City, Pa. "Drake."

OILZUM—See White & Bagley Co.

ORIENTAL—See Reliance Oil & Grease Co.

PACKARD—See Havoline Oil Co.

PACKARD 24-30—See Greenslade Oil Co.

PANHARD—See Haws, Geo. A.

PAN-O-LITE—See Miller's Sons.

PARAGON Refining Co., Front St., Toledo, Ohio.

PARAMOUNT—See Baker, Wm. T.

PARIS—See American Oil Co.

PATTISON & Ellis, 213 Jefferson Ave., Detroit, Mich. "White," "Royaline."

PENN Oil & Supply Co., Chicago, Ill.

PENN Petroleum Co., 117 North Second St., Philadelphia, Pa. "Primus."

PERFECTION Grease Co., South Bend, Ind. "Triumph."

PERRY Oil Co., 372 Central Ave., Pawtucket, R. I.

PETROLEUM Products Co., 3600 Grant Blvd., Pittsburg, Pa.

PHILADELPHIA Grease Mfg. Co., 848-50 S. Swanson St., Philadelphia, Pa.

PHOENIX—See National Refining Co.

PIGOT, Sayre & Co., 135 William St., New York, N. Y. "Aurora."

PRIMUS—See Penn Petroleum Co.

PULVER & Sons, Peter; N. Y. City.

RED CROSS—See Auto Oil Co.

RELIANCE Oil & Grease Co., 1501-21 Columbus Road, Cleveland, O. "Electric." "National." "Oriental."

RICHARDSON Lubricating Co., Quincy, Ill.

ROBINSON & Son Co., Wm. C., 336-42 North St., Baltimore, Md. "Autoline."

ROYAL—See National Refining Co.

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y. "Min-Carb."

ROYALINE—See Pattison & Ellis.

SHEA Lubricator Co., 82 Partridge Ave., Somerville, Mass.
(See page 209.)

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J.

SILEX—See Borne-Scrymser Co.

SOLIDOYL—See Musliner & Co.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."
(See page 211.)

SOUTHWICK, T. T., 19 Upton Park, Rochester, N. Y. "Universal."

SPARROW—See American Oil & Disinfectant Co.

SPEAR'S Sons Co., Alden, 369 Atlantic Ave., Boston, Mass.

STANDARD Oil Co., 26 Broadway, N. Y. City. "Zerolene."

STAR Lubricating Co., 232 W. 28th St., New York, N. Y.

SULLIVAN Oil Co., 48 Wells St., Chicago, Ill.
(See page 167.)

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y.
(See page 461.)

SWEET, Charles F., Pearl & Haynes Sts., Hartford, Conn. "Climax," "Mercedes."

TIONA Refining Co., Indianapolis, Ind.

TRIUMPH—See Perfection Grease Co.

TYGERT Co., E. A., 614 Chestnut St., Philadelphia, Pa. "Motorlube."

UNDERHAY Oil Co., 275 Franklin St., Boston, Mass.

UNITED States Graphite Co., Saginaw, Mich.

UNITED States Mica Co., 238-40 La Salle St., Chicago, Ill. "Micaflake."

UNIVERSAL—See Southwick, T. T.

VACUUM Oil Co., 29 Broadway, New York, N. Y.
(See page 385.)

VALVOLINE Oil Co., Boston, Mass.
(See page 381.)

VISCOS—See National Oil & Supply Co.

VISCOSITY Oil Co., 21 River St., Chicago, Ill.

WADHAMS Oil Co., 215 National Ave., Milwaukee, Wis. "Badgers."

WAVERLY Oil Works, 54th St. & A. V. R. R., Pittsburg, Pa.
(See page 163.)

WHALE—See Nye, Wm. F.

WHITE—See Pattison & Ellis.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Oilzum."

WILBURINE Oil Works, 11 Broadway, New York, N. Y.

WINN Co., F. R., 147 Maiden Lane, N. Y. City.

WITTMANN & Beach, 205-11 S. 11th St., Lincoln, Neb.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.
(See page 383.)

ZEROLENE—See Standard Oil Co.

LUBRICATORS

HAND LUBRICATORS OR OIL PUMPS

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.
(See page 423.)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

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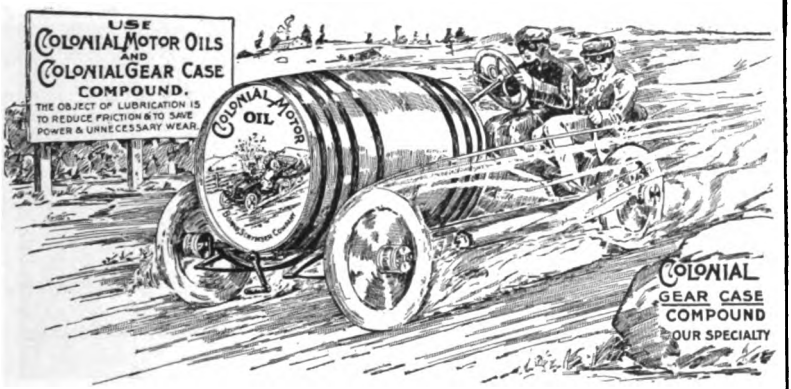
TO OBTAIN THE BEST RESULTS, USE THE BEST LUBRICANTS.
CAN BE HAD AT GARAGES, OR AT ANY OF OUR STORES



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AND

SILEX GREASE

FOR MOTOR CARS AND MOTOR BOATS

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80 South Street, New York

BOSTON
36 Central Wharf

PHILADELPHIA
216 North Front Street

FALL RIVER, MASS.
160 Third Street

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LUBRICATORS (Continued)

HAND LUBRICATORS OR OIL PUMPS (Continued)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

MECHANICAL LUBRICATORS OR OIL PUMPS

(Engine driven Oil Pumps)

CHURCHILL-LEE Co., 907-09 Michigan Ave., Detroit, Mich. (See page 151.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HILL—See Precision Appliance Co.

KINSEY Mfg. Co., Dayton, O. "Kinwood." (See page 143.)

KINWOOD—See Kinsey Mfg. Co.

LAVIGNE Mfg. Co., 608 Commonwealth St., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McCANNA Mfg. Co., 58 N. Jefferson St., Chicago, Ill. (See page 509.)

McCORD & Co., Detroit, Mich. (See page 423.)

MADISON-KIPP Mfg. Co., Madison, Wis.

MANZEL Bros. Co., 314 Babcock St., Buffalo, N. Y.

NEELY & Co., Edward, 244-46 Wells St., Chicago, Ill.

PEDERSEN Mfg. Co., 400-412 E. 37th St., New York, N. Y. (See page opposite.)

PRECISION Appliance Co., 832 Austin Ave., Chicago, Ill. "Hill."

SCHOELKOPF Mfg. Co., 1516 Williamson St., Madison, Wis.

STANDARD Automatic Lubricator Co., 361-63 Ellicott St., Buffalo, N. Y.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

WOOD Mfg. Co., Geo., 236-42 Bank St., Newark, N. J.

OIL AND GREASE CUP LUBRICATORS

(See Cups, Oil and Grease)

PRESSURE LUBRICATORS

DETROIT Lubricator Co. Lincoln Ave. & G. T. R. R., Detroit, Mich.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

LONERGAN & Co., J. E., 211-13 Race St., Philadelphia, Pa.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

PEDERSEN Mfg. Co., 400-412 E. 37th St., New York, N. Y. (See page opposite.)

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

WILKINSON Co., Wm. H., West Medway, Mass.

LUGS

TIRE LUGS

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

DIEN, Ch., 43-45 W. 34th St., New York, N. Y. (Importer.)

SCOVILLE Mfg. Co., 99 Mill St., Waterbury, Conn.

STERLING Machine & Stamping Co., Vermillion, O. (See page 459.)

MACHINES

TIRE FILLING MACHINES

AUTO Tire Filling Machine Co., 92 La Salle St., Chicago, Ill. (See page 361.)

MACHINE WORK

SPECIAL MACHINE WORK TO ORDER

(See also Screw Machine Parts)

ACORN Brass Mfg. Co., 51 N. Peoria St., Chicago, Ill.

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill. (See page 221.)

AMERICAN Die & Tool Co., Reading, Pa.

AMERICAN Gear & Mfg. Co., 205 W. South St., Indianapolis, Ind.

AMERICAN Machine & Mfg. Co., 877 Addison Road, Cleveland, O.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y. (See page 357.)

BLAKE & Johnson Co., 125 E. Main St., Waterbury, Conn.

BLANCHARD Machine Co., Boston, Mass.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CASSADY Fairbank Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CLIMAX Machinery Co., Indianapolis, Ind.

CRANE & Whitman Co., 94-104 W. 7th St., Bayonne, N. J.

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich.

Complete Index to Classification appears on Pages 7 to 18.

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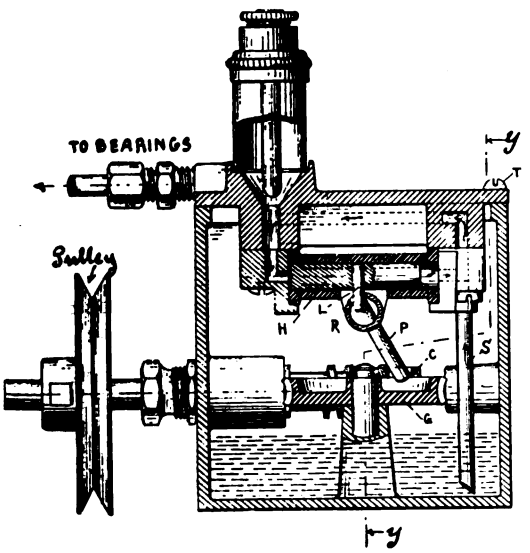
Type C and CX

MECHANICAL OILERS

are a modification of type X, selling at a price that will interest every manufacturer.



NO SPRINGS
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TROUBLE

We have just introduced a new regulating device which, while it gives the finest adjustment, is indestructible.

Write us about your lubricator requirements.
We make all kinds for gasoline motors, etc.

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MACHINE WORK (Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

DIAMOND Chain & Mfg. Co., 231 West Georgia St., Indianapolis, Ind.
(See page 85.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

FERRO Machine & Foundry Co., 251 Wade Bldg., Cleveland, O.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill.
(See page 451.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.
(See page 351.)

GENERAL Manufacturing Co., Richmond & McDonald Sts., Elkhart, Ind.

GEOMETRIC Tool Co., New Haven, Conn.

GILL & Sons Forge & Machine Works, P. H., 1 Lorraine St., Brooklyn, N. Y.
(See page 319.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

HALL Machine Co., 54 N. Desplaines St., Chicago, Ill.
(See page 393.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 481.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOLT & Co., W. H., 95 Pine St., Providence, R. I.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

JACKSON-CHURCH-WILCOX Co., 321 N. Hamilton St., Saginaw, Mich.

JONES Motor Co., Geo. H., Sixth & Erie Sts., Camden, N. J.

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio.
(See page 499.)

LONG Arm System Co., Cleveland, O.
(See page 93.)

MANVILLE Bros. Co., 25-33 Benedict St., Waterbury, Conn.

MASSNICK Mfg. Co., 1559 Jefferson Ave., Detroit, Mich.

MICHIGAN Automobile Co., Kalamazoo, Mich.

MOORE & Co., Indiana & Franklin Sts., Chicago, Ill.

NATIONAL Cycle Mfg. Co., Bay City, Mich.

NATIONAL Engineering Co., Saginaw, Mich.

NATIONAL Stamping & Electric Works, 153-59 S. Jefferson St., Chicago, Ill.
(See page 375.)

PRITCHARD Novelty Mfg. Co., Viaduct Power Blk., Cleveland, O.

REINKE & Shirray Mfg. Co., 441-53 Lafayette Blvd., Detroit, Mich.

SAYRE Stamping Co., Sayre, Pa.

SCHWEPPE & Wilt, Congress & Sixth Sts., Detroit, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 217.)

TAFT-PIERCE Mfg. Co., Woonsocket, R. I.

THROOP Perforating Co., 80 Terrace, Buffalo, N. Y.

TURNER Brass Works, Sycamore, Ill.

WADE Machine Co., 133 Oliver St., Boston, Mass.
(See page 109.)

WIDMER Machine Works, Boydell Blk., Detroit, Mich.
(See page 467.)

MAGNETOS

IGNITION MAGNETOS AND DYNAMOS

APLCO—See Apple Electric Co.

APPLE—See Dayton Electrical Mfg. Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 49.)

AUTO SPARKER—See Motsinger Device Mfg. Co.

BOSCH Magneto Co., 160 W. 56th St., New York, N. Y.

BRETZ Co., J. S., Times Bldg., New York, N. Y. (Importers). "U. & H."
(See page opposite.)

BROC-BARBIER Auto Ignition Co., 143 W. 54th St., New York, N. Y.

BULL-DOG—See Igniter Appliance Co.

CARLISLE & Finch Co., 229-31 E. Clinton Ave., Cincinnati, O.

CHAMPION Co., Albert, 38 Whittier St., Boston, Mass. "Simpell."
(See page 413.)

CHAMPION Igniter Co., Flint, Mich.

D.-K. Electric Co., 106-110 Locust St., St. Louis, Mo. "Duncan-Kaye."

DAYTON Electrical Mfg. Co., 32 N. St. Clair St., Dayton, O. "Apple."

DOW Portable Electric Co., Adams St., Braintree, Mass. "Komet."

DUNCAN-KAYE—See D.-K. Electric Co.

EISEMANN—See Lavalette & Co.

ELBRIDGE Electric Co., Elbridge, N. Y.

ENGINEERING Specialty Co., 143 Liberty St., New York, N. Y.

EUREKA—See Henricks Novelty Co.

EUREKA—See Igniter Appliance Co.

FAWN River Mfg. Co., Constantine, Mich.

FISHER Co., A. W., 816 Forest Ave., S. Bend, Ind.

FULMINA—See Lehman Mfg. Co.

GARY Co., Theo. H., 50 Franklin St., New York, N. Y. (Importers).
(See page 151.)

GENERAL Electric Co., Schenectady, N. Y.

GLAENZER & Co., 26-28 Washington Pl., New York, N. Y. (Importers). "Nieuport."

GOODSON Electric & Mfg. Co., Providence, R. I.
(See page 101.)

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TWO FEATURES
ESPECIALLY DISTINGUISH THE
UNTERBERG & HELMLE

SELF-STARTING MAGNETO

TYPE L-E

The Distributor and Interrupter Dismounted

The first of these is the self-starting device itself, by which a spark of maximum intensity, properly retarded for safety, is delivered when the motor is cranked for starting. It makes no difference how slowly the crank is turned or where the spark advance lever is set, the spark and the retard are the same. When the motor starts the self-starter automatically goes out of action and the spark is advanced by hand in the usual way. The other feature is the extreme accessibility of all parts with which the user is legitimately concerned. This includes the self-starter, the interrupter, the condenser and the distributor. All of these can be dismounted in a few minutes and replaced without possibility of error.

In design and construction the U. & H. Magneto upholds the highest standards of the old world. It is not a cheap magneto but it is well worth its price.

Other styles are made without the self-starting device and to suit special conditions.

The Self-Starting Device

J.S. BRETZ COMPANY

Sole Importers, TIMES BUILDING, NEW YORK

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MAGNETOS (Continued)

IGNITION MAGNETOS AND DYNAMOS (Continued)

HEINZE Electric Co., Lowell, Mass. (See page 231.)

HEIZER Magneto Co., 200 E. Ninth St., Anderson, Ind.

HENRICKS Novelty Co., 132 S. Capitol Ave., Indianapolis, Ind. "Eureka."

HERCULES Electric Co., 709 Langsdale Ave., Indianapolis, Ind. "Star," "Kurtz."

HESS-BRIGHT Mfg. Co., 2101 Fairmont Ave., Philadelphia, Pa. (See page 445.)

HOLLEY Bros. Co., Detroit, Mich. (See page 187.)

HOLTZER-CABOT Electric Co., Brookline, Mass.

HUFF Co., E. S., 69 Woodward Ave., Detroit, Mich.

HURD & Haggin, 316 Hudson St., New York, N. Y. "Le Pontois."

IGNITER Appliance Co., 309 Electric Bldg., Cleveland, O. "Bull-Dog." "Eureka."

K-W Ignition Co., 35 Power Ave., Cleveland, O. (See page opposite.)

KNOBLOCK-HEIDEMAN Mfg. Co., High St. & L. S. & M. S. Ry., South Bend, Ind. "Quick Action."

KOMET—See Dow Portable Electric Co.

KURTZ—See Hercules Electric Co.

LAVALETTE & Co., 112-14 W. 42d St., New York, N. Y. "Eisemann." (See page 479.)

LE PONTOIS—See Hurd & Haggin.

LEHMAN Mfg. Co., J. H., 170 Broadway, New York, N. Y. "Fulmina." (See red insert.)

MAVITY-SLEEPER Co., Fowler, Ind.

MOTSINGER Device Mfg. Co., 36 Main St., Pendleton, Ind. "Auto Sparker."

NATIONAL Coil Co., 420 Michigan Ave., E. Lansing, Mich. (See page opposite inside front cover.)

NIEUPORT—See Glaenzer & Co.

PERFECTION Magneto Co., Third & John Sts., Anderson, Ind.

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 95.)

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

REMY Electric Co., Anderson, Ind. (See page 417.)

RYDER—See Spicer Universal Joint Mfg. Co.

SIMPELL—See Champion Co.

SPICER Universal Joint Mfg. Co., 15 Madison Ave., Plainfield, N. J. "Ryder." (See page 191.)

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 433.)

STANDARD Motor Construction Co., 172 Whiton St., Jersey City, N. J.

STAR—See Hercules Electric Co.

SWISS-KOMET—See Wende Ignition Co.

TRITT Electric Co., 301 S. Division St., Union City, Ind. "Vim."

U. & H.—See Bretz Co.

VIM—See Tritt Electric Co.

VOLTA—See Witherbee Igniter Co.

WENDE Ignition Co., 348-52 Wabash Ave., Chicago, Ill. (Importers.) "Swiss-Komet."

WHEELER & Schebler, Shelby & Sanders Sts., Indianapolis, Ind.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Volta." (See page 205.)

MANIFOLDS

INTAKE AND EXHAUST MANIFOLDS

(Brazed and Welded Manifolds. For Cast Manifolds —See Castings)

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

BADGER & Sons Co., E. B., 63-75 Pitts St., Boston, Mass.

BUSH Mfg. Co., 79 Commerce St., Hartford, Conn. (See page 197.)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

NATIONAL Pipe Bending Co., 110 River St., New Haven, Conn. (See page 327.)

NUGENT, William H., 775 Third Ave., Brooklyn, N. Y. (See page 255.)

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y. (See page 147.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn. (See page 255.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

MAPS

ROAD MAPS

CLASSON Map Co., Denver, Col.

MENDENHALL, C. S., Race St. & Opera Pl., Cincinnati, O.

OFFICIAL Automobile Blue Book, 231-241 W. 39th St., N. Y. City.

SURVEY Map Co., 428 Lafayette St., N. Y. City.

WALKER & Co., Geo. H., 221 High St., Boston, Mass.

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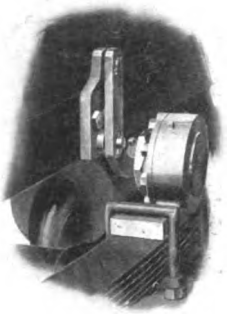

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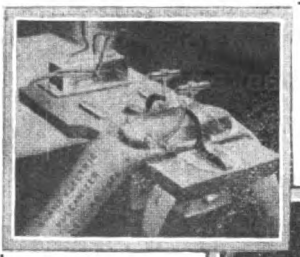

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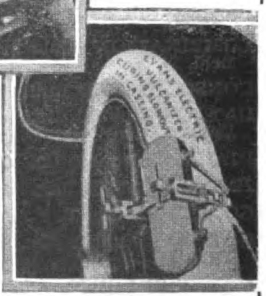

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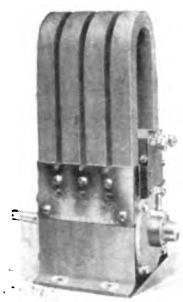

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Chicago " The Automobile Supply Co., 1339 Michigan Bldg.
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RUBBER MATS

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass. "Lenox," "Tiger."

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J.

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, Ohio.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber Mfg. Co., Trenton, N. J.

GOODRICH, Co., B. F., Akron, O.

GOTHAM Rubber Co., 45 South St., New York, N. Y.

HARTFORD Rubber Works Co., Hartford, Conn.

HOME Tire Co., Trenton, N. J.
(See page 505.)

LENOX—See Boston Woven Hose & Rubber Co.

MANHATTAN Rubber Mfg. Co., 18 Vesey St., New York, N. Y.

MATTSON Rubber Co., Lodi, N. J.
(See page 151.)

MECHANICAL Rubber Co., C. & P. R. R. near Nickel Plate R. R., Cleveland, O.

MILFORD Rubber Works, Milford, Ill.

MONARCH Rubber Co., 41 N. 7th St., Philadelphia, Pa.

NEW JERSEY Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PEERLESS Rubber Mfg. Co., 16 Warren St., N. Y. City.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

TIGER—See Boston Woven Hose & Rubber Co.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J.
(See page 45.)

VICTOR Rubber Co., Springfield, O.

WALPOLE Rubber Works, Walpole, Mass.
(See page opposite.)

STEEL MATS

CARY Mfg. Co., 19-21 Roosevelt St., New York, N. Y.
(See page opposite.)

METALS

BEARING METALS

ACORN—See Cadman Mfg. Co.

AJAX Metal Co., Philadelphia, Pa.

ALLYNE Brass Foundry Co., Cleveland, O., Detroit, Mich., & Buffalo, N. Y.
(See page opposite title page.)

AMERICAN Bronze Co., Berwyn, Pa. "Non-Gran."
(See page 451.)

AMERICAN Manganese Bronze Co., 99 John St., New York, N. Y. "Spare's."
(See page opposite.)

CADMAN Mfg. Co., A. W., Smallman & 28th Sts., Pittsburg, Pa. "Acorn."

CLUM & Atkinson, 543 Lyell Ave., Rochester, N. Y. "Superior," "Plata."
(See page 365.)

COLUMBIA Smelting & Refining Works, 365-67 West St., New York, N. Y.

CRAMP & Sons' Ship & Engine Building Co., Wm., Beach & Ball Sts., Philadelphia, Pa. "Parsons."

DAMASCUS Bronze Co., Pittsburg, Pa.

ELEPHANT—See Phosphor Bronze Smelting Co.

FAHRIG Metal Co., 316-22 Hudson St., New York, N. Y.

GARDINER Metal Co., 454-56 W. Lake St., Chicago, Ill.

GLOBE Metal Co., 434 W. Lake St., Chicago, Ill.

LUMEN Bearing Co., Lathrop St., Buffalo, N. Y.

MAGNOLIA Metal Co., 113-115 Bank St., N. Y. City.

MERCHANT & Evans Co., Philadelphia, Pa.
(See page 327.)

NATIONAL Lead Co., 100 William St., New York, N. Y.

NEW Era Mfg. Co., Kalamazoo, Mich.

NON-GRAN—See American Bronze Co.

PALMETTO Metal Co., 586 W. Lake St., Chicago, Ill.

PARSONS—See Cramp & Sons.

PLATA—See Clum & Atkinson.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant."
(See page 453.)

PITTSBURG White Metal Co., 3116-18 Penn Ave., Pittsburg, Pa.
(See page 393.)

REEVES & Son, Paul S., 1415 Catherine St., Philadelphia, Pa.

SEMPER IDEM—See Wildes, Thomas.

SHONBERG, I., 363 Hudson Ave., Brooklyn, N. Y.

SPARE'S—See American Manganese Bronze Co.

SUPERIOR—See Clum & Atkinson.

SYRACUSE Smelting Works, 28 Dobbin St., Brooklyn, N. Y.

TRAKA Metal Co., Medford, Mass.

UNITED States Bronze Co., 1831 Columbus Road, Cleveland, O.

VICTOR Metals Co., E. Braintree, Mass.

WILDES, Thomas, 21 Maiden Lane, New York, N. Y. "Semper Idem."

WILLIAMS & Son, E. A., 107 Plymouth St., Jersey City, N. J.

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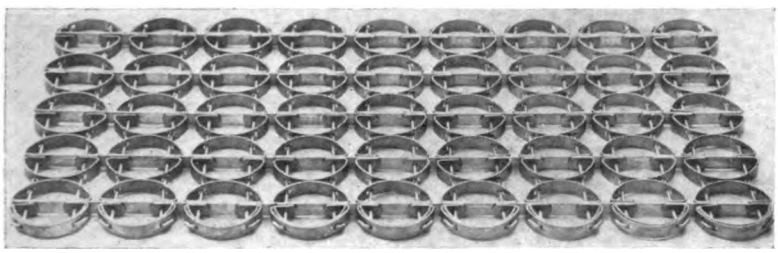

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PERFORATED METALS (Continued)

HARRINGTON & King Perforating Co., 236 N. Union St., Chicago, Ill.

MUNDT & Sons, Chas., Jersey City, N. J.

THROOP Perforating Co., 80 Terrace, Buffalo, N. Y.

MICA Manufacturing Co., 307 W. Broadway, New York, N. Y.

MUNSELL & Co., Eugene, 218 Water St., New York, N. Y.

SCHOONMAKER, A. O., 221 Fulton St., New York, N. Y.

VANCE, D. T., Plumtree, N. C.

WATSON Bros., 170 Purchase St., Boston, Mass.

METERS

COMPRESSION METERS

(See Gauges, Cylinder Compression)

DIRECTION INDICATING METERS

SHAWVER Co., Springfield, O. "Directo-Meter."

DISTANCE RECORDING METERS OR ODOMETERS

(For Combined Odometers and Speedometers—See Speedometers)

JONES Speedometer Co., New Rochelle, N. Y.

LIPMAN Mfg. Co., 210 Pleasant St., Beloit, Wis.

STAR Speedometer Co., Danville, Pa.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

GRADE METERS

ADAMS Co., Dubuque, Ia.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SPEED METERS

(See Speedometers)

TAXIMETERS

(See Taximeters)

MICA

AMERICAN Mica Co., Newton Lower Falls, Mass.

ASHEVILLE Mica Co., Asheville, N. C.

CHICAGO Mica Co., Valparaiso, Ind.

MICA Insulator Co., 218 Water St., New York, N. Y.

MIRRORS

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(To enable driver to see to the rear of the car)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.
(See page 221.)

ALEXANDER Co., J., 1931 Broadway, New York, N. Y. "Mirrorscope."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y.

MIRRORSCOPE—See Alexander Co.

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

WATER GAUGE MIRRORS

KNOX Co., The Frank J., Hartford, Conn.

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ABBOTT, W. H., 1263 Broadway, N. Y. City.

BERNARD Co., J., 477-79 Tenth Ave., New York, N. Y.

CHICAGO Art Metal Works, 67 Lake St., Chicago, Ill.

CHILDS & Co., S. D., 200 S. Clark St., Chicago, Ill.

COLGAN Co., J. W., Sudbury Bldg., Boston Mass.
(See page 19.)

DUNN Co., Thos. J., Chambers St., cor. Church St., New York, N. Y.
(See page opposite.)

FINE, Horace E., 19 E. State St., Trenton, N. J.

GREENDUCK Co., 200 S. Clinton St., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.
(See page 423.)

HANSON, C. H., 44 S. Clark St., Chicago, Ill.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

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MURDOCK Co., James, Jr., 116 Opera Pl., Cincinnati, O.

OULTON Engraving Co., Attleboro, Mass.

REES, F. H., Steele Memorial Bldg., Elmira, N. Y.

SALMAN & Co., John A., 17 Bromfield St., Boston, Mass.

STAFFORD Co., N., 67 Fulton St., N. Y. City.

TURNER Brass Works, Sycamore, Ill.

WALTER & Sons, N. C., 194 William St., New York, N. Y. (See page 493.)

WHITEFORD & Co., Jos. G., 23-27 N. Jefferson St., Chicago, Ill.

MOTORS

ELECTRIC AUTOMOBILE MOTORS

ELWELL-PARKER Electric Co., 4225 St. Clair Ave., Cleveland, O. (See page 19.)

GENERAL Electric Co., Schenectady, N. Y.

LINCOLN Electric Co., 38th St. & Kelley Ave., N. E., Cleveland, O.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

GASOLINE AUTOMOBILE MOTORS

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN & British Mfg. Co., Bridgeport, Conn.

AMERICAN Motor Co., Eau Claire, Wis.

ANDERSON Engine Co., Shelbyville, Ill.

AURORA Automatic Machinery Co., Aurora, Ill.

BEAVER Mfg. Co., Milwaukee, Wis. (See page 185.)

BEILFUSS Motor Co., Lansing, Mich. (See page 189.)

BRENNAN Motor Co., Syracuse, N. Y.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

BUDD & Ranney Mfg. Co., 35-37 S. Scioto St., Columbus, O.

BUFFALO Engine Co., 12-20 Perry St., Buffalo, N. Y.

CARRICO—See Speed Changing Pulley Co.

CARRICO Motor Co., Cincinnati, O.

CHASE Motor Truck Co., 332 S. West St., Syracuse, N. Y.

CLARK Motor Co., E. C., E. LeRoy St., Jackson, Mich.

COLUMBUS Screw & Machine Co., 244-46 Kaiser St., Columbus, O.

CONTINENTAL Engine Co., 501 Monon Bldg., Chicago, Ill.

CONTINENTAL Motor Mfg. Co., Muskegon, Mich. (See page opposite.)

CROUCH & Co., Chas. P., 152 E. Lake St., Chicago, Ill.

CURTISS Mfg. Co., G. H., Hammondsport, N. Y.

DAVIS Mfg. Co., 15th Ave. & Park St., Milwaukee, Wis.

DEMOREST Mfg. Co., Williamsport, Pa. "Early."

DESCHLER, August, 18-20 East Water St., Chillicothe, O.

DE TAMBLE—See Speed Changing Pulley Co.

EARLY—See Demorest Mfg. Co.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GENERAL Mfg. Co., Richmond & MacDonald Sts., Elkhart, Ind.

GRANT-FERRIS Co., Troy, N. Y.

HARVARD Machine & Auto Co., 25 Eliot St., Cambridge, Mass.

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HERSCHELL-SPILLMAN Co., North Tonawanda, N. Y.

HOFFMAN Launch & Motor Works, W., 1253 North Halstead St., Chicago, Ill.

ILLINOIS—See Moline Pump Co.

ILLINOIS Auto & Parts Co., Globe & Main Sts., Peoria, Ill.

JENCICK Motor Mfg. Co., Port Chester, N. Y.

JONES Motor Co., Geo. H., 6th & Erie Sts., Camden, N. J.

KIRKHAM Motor Mfg. Co., Bath, N. Y.

LAUTH-JUERGENS Motor Car Co., 94-98 Rawson St., Chicago, Ill.

MICHIGAN Automobile Co., Kalamazoo, Mich.

MILWAUKEE Auto Engine & Supply Co., 706-708 Winnebago St., Milwaukee, Wis.

MILWAUKEE Motor Co., 32d & Burleigh Sts., Milwaukee, Wis.

MODEL Automobile Co., Peru, Ind.

MONARCH Motor Mfg. Co., 1592-1600 N. Halsted St., Chicago, Ill.

MULTI-UNIT Gas Engine Co., 1256 Michigan Ave., Chicago, Ill.

MURRAY, W. B., 1253 Milwaukee Ave., Chicago, Ill.

NEER Air Cooled Engine Co., Plain City, O.

NEW PROCESS Steel Co., 210 W. River St., Marshall, Mich. (See page 253.)

NORTH Chicago Machine Co., North Chicago, Ill. (See page 429.)

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich. (See page 183.)

OSWALD Motor Co., 410 E. Washington St., Goshen, Ind.

PACIFIC Iron Works, 113 E. Washington St., Bridgeport, Conn.

PEUGEOT—See Prospect Motor Co.

PROSPECT Motor Co., 1900 Broadway, New York, N. Y. (Importers). "Peugeot."

REEVES Pulley Co., Columbus, Ind.

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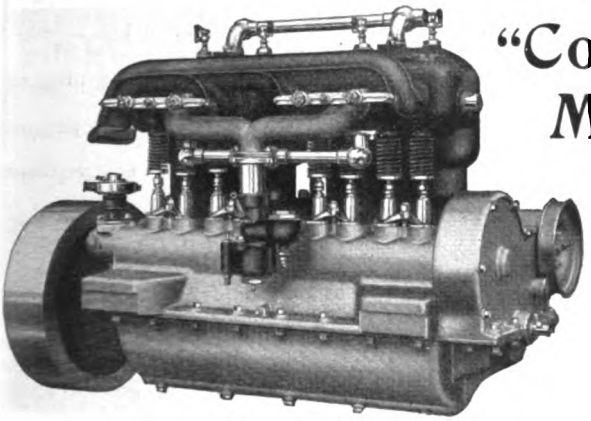

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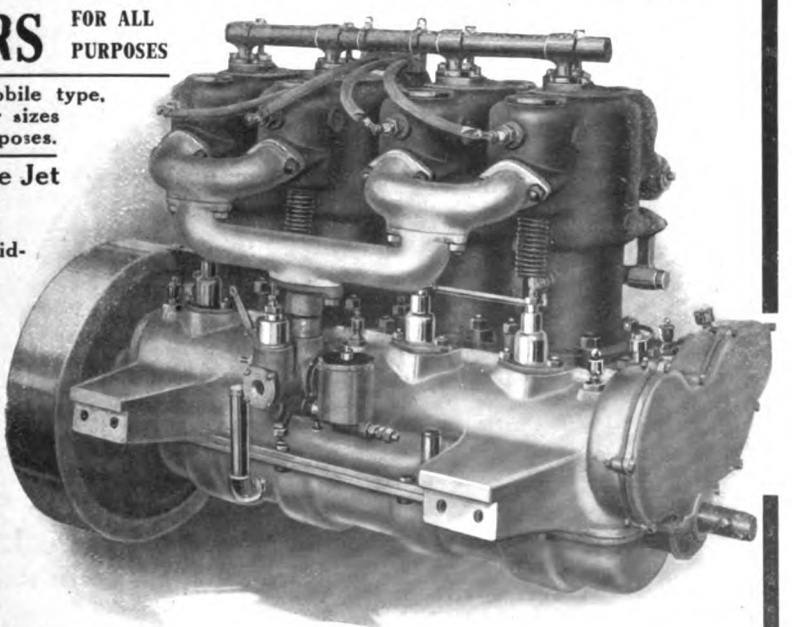

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MOTORS (Continued)

GASOLINE AUTOMOBILE MOTORS (Continued)

ROBERTS Motor Co., Columbus, Ave., Sandusky, O.

RUTENBER—See Western Motor Co.

SCHAUB & Son Machine Co., 3064 Henslaw Ave., Cincinnati, O. (See page 429.)

SCHLOSSER Mfg. Co., 151 E. 126th St., New York, N. Y. (See page 181.)

SOMMER Motor Co., Aurora, Ill.

SPEED Changing Pulley Co., Anderson, Ind. "Carrico," "De Tamble." (See page 387.)

SPEEDWELL—See Yocum Co.

SWAIN Engine Co., 2239 State St., Chicago, Ill.

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O. (See page 189.)

TORBENSEN Motor Car Co., Bloomfield, N. J.

TREBERT, H. L. F., 1122 St. Paul St., Rochester, N. Y.

TREBERT Gas Engine Co., 35 Ford St., Rochester, N. Y.

TROJAN Motor Co., 809 Nelson St., Louisville, Ky.

WAUKESHA Motor Co., Waukesha, Wis. (See page 185.)

WEST St. Louis Machine & Tool Co., 606 Manchester St., St. Louis, Mo.

WESTERFIELD Motor Co., Main St. & Big Four R. R., Anderson, Ind. (See page 75.)

WESTERN Motor Co., Logansport, Ind. "Rutenber." (See page 75.)

WILLET Engine & Carbureter Co., 766 Ellicott Sq., Buffalo, N. Y. (See page opposite.)

WISCONSIN Auto Supply Co., Two Rivers, Wis.

WISCONSIN Machinery & Mfg. Co., Canal St. & Muskegon Ave., Milwaukee, Wis.

WRIGHT Motor Co., 48 S. Division St., Buffalo, N. Y.

XARDELL Co., J. A. & C. A., Utica, N. Y.

YOCOM Co., A. H., Reading, Pa. "Speedwell."

GASOLINE MARINE MOTORS

AERO & Marine Motor Co., 60 Pemberton Sq., Boston, Mass.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN & British Mfg. Co., Bridgeport, Conn.

AMERICAN Motor Co., Eau Claire, Wis.

ANDERSON Engine Co., Shelbyville, Ill.

ANTOINETTE Motor Co. (E. Providence), Providence, R. I.

ARDMORE—See Keidel & Co., Baltimore, Md.

ART Machine Co., 217 Fulton St., Brooklyn, N. Y. "Fulton."

AUTO Engine Works, Rice & Fuller Sts., St. Paul, Minn. "Capitol."

AUTOMATIC Machine Co., 147-53 Stratford Ave., Bridgeport, Conn.

BARBER Bros., 101 Grape St., Syracuse, N. Y.

BARKER, C. L., South Norwalk, Conn.

BELCHER Motor Co., Fall River, Mass.

BENTON & Son, La Crosse, Wis.

BOOTHBAY Gas Engine Co., E. Boothbay, Me.

BRENNAN Motor Co., Syracuse, N. Y.

BRIDGEPORT Motor Co., Bridgeport, Conn.

BROWN-COCHRAN Co., Lorain, O. "Lacy."

BROWN-TALBOT Co., Salem, Mass.

BROWNELL Motor Co., F. A., 634-36 Lexington Ave., Rochester, N. Y.

BRUNO-KNAPP Co., Saginaw, W. S., Mich.

BUDD & Ranney Mfg. Co., 35-37 S. Scioto St., Columbus, O.

BUFFALO Arrow Motor Co., 35 Mississippi St., Buffalo, N. Y.

BUFFALO Gasoline Motor Co., 1286 Niagara St., Buffalo, N. Y.

BULL-PUP—See Fairfield Motor Co.

CAILLE Perfection Motor Co., Second Ave. & Amsterdam St., Detroit, Mich. "Perfection."

CAMDEN Anchor-Rockland Machine Co., Rockland, Me. "Knox."

CAMPBELL Motor Co., Wayzata, Minn.

CAPITOL—See Auto Engine Works.

CLARK Mfg. Co., Fond-du-Lac, Wis.

CLAY & Co., E. H., 6950 Kinsman Road, Cleveland, O.

CLIFTON Motor Works, 230 Clifton Ave., Cincinnati, O.

CLIPPER Lawn Mower Co., Dixon, Ill.

COLUMBUS Screw & Machine Co., 244-46 Kaiser St., Columbus, O.

COOLEY Mfg. Co., Waterbury, Vt.

CONTINENTAL Motor Mfg. Co., Muskegon, Mich. (See page 181.)

CRAIG, James, 556 W. 34th St., New York, N. Y.

CROSS Engine Co., M. O., 800-06 Bellevue Ave., Detroit, Mich.

CROUCH & Co., Chas. P., 152 E. Lake St., Chicago, Ill.

CUSHMAN Motor Co., Lincoln, Neb.

DAVIS Mfg. Co., 15th Ave. & Park St., Milwaukee, Wis.

DELRAY Motor Works, 2245 River St., Detroit, Mich.

DE MOOY Bros., 1831-36 E. 55th St., N. E., Cleveland, O.

DOMAN Co., H. C., Oshkosh, Wis.

DUCRO Mfg. Co., 1378 Niagara St., Buffalo, N. Y. "Niagara."

DUNN, Walter E., Ogdensburg, N. Y.

EAGLE—See Progressive Mfg. Co.

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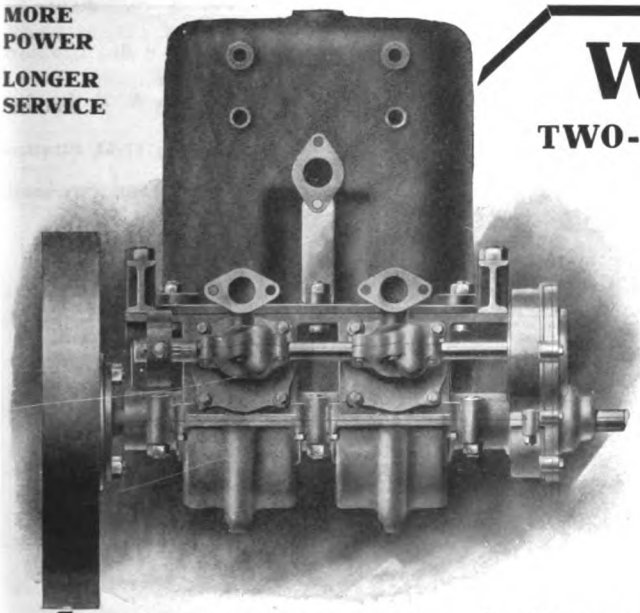
LONGER SERVICE



WILLET

TWO-CYCLE ENGINE

1 to 6 Cylinders.
8 to 70 H. P.
With Rotary Valve Inlet, Perfectly Balanced.

SIMPLE DURABLE
POWERFUL FLEXIBLE

Auto Manufacturers, Dealers and Repairmen should investigate this engine no matter how contented you may feel with the one you now use.

HERE IS SOMETHING THAT IS DISTINCTLY BETTER

Its features cannot be explained here. In rief they are: Entirely new principle developed from severest comparative tests—an engine perfectly counter-balanced--an engine with a perfect valve—the most flexible engine on the market—more power for its weight and size than any other—the simplest constructed—for accessibility it has no equal.

YOU SHOULD KNOW ALL ABOUT IT—WRITE TO-DAY

WILLET ENGINE & CARBURETER CO. 766 ELLICOTT SQUARE BUFFALO, N.Y.

"The NORTHWAY is the BEST way."

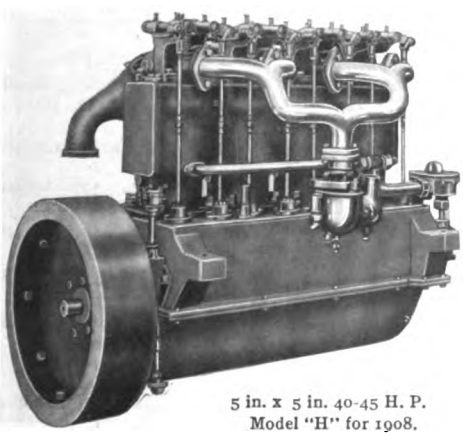
NORTHWAY MOTORS

DEVELOP THEIR FULL-RATED

POWER

Write for Bulletins of our

Motors Transmission Gears and Clutches



5 in. x 5 in. 40-45 H. P.
Model "H" for 1908.

We build several sizes from our own designs.

Let us figure on motors from your drawings.

NORTHWAY MOTOR & MFG. CO.

510 to 514 Maybury Grand Ave., Detroit, Mich.

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MOTORS (Continued)

GASOLINE MARINE MOTORS (Continued)

EASTERNHOUSE Engine Co., Taunton, Mass.

ECLIPSE Motor Co., Mancelona, Mich.

ERD Motor Co., Saginaw, Mich.

ERICSSON & Moon Mfg. Co., 64 Second St., Detroit, Mich.

ESSEX Engine Co., Lynn, Mass.

FAIRBANKS-GRANT Mfg. Co., Ithaca, N. Y.

FAIRBANKS, Morse & Co., Wabash Ave. & Eldridge St., Chicago, Ill.

FAIRFIELD Motor Co., 1047 Broad St., Bridgeport, Conn. "Bull-Pup."

FAY & Bowen Engine Co., 92 Lake St Geneva, N. Y.

FERRO Machine & Foundry Co., 251 Wade Bldg., Cleveland, O.

FISHERMAN—See Loane-Hiltz Engineering Co.

FOX Reversible Gasoline Engine Co., Front & Washington Sts., Newport, Ky.

FRISBIE Motor Co., Water St., Middletown, Conn.

FULTON—See Art Machine Co.

GAS Engine & Power Co. & Chas. L. Seabury Co., Morris Heights, New York, N. Y. "Speedway."

GENERAL Machinery Co., 96 Trumbull St., Bay City, Mich. "Smalley."

GLOBE—See Pennsylvania Iron Works Co.

GOSHEN Motor Works, 9th St. & Lincoln Ave., Goshen, Ind.

GRAND Rapids Yacht & Engine Co., 96 Front St., Grand Rapids, Mich.

GRASSER—See Toledo Motor Co.

GRAY & Prior Machine Co., 32 Suffield St., Hartford, Conn. "Hartford." (See page 305.)

GRAY-HAWLEY Mfg. Co., 608 W. Fort St., Detroit, Mich. (See page 289.)

GRAY Motor Co., Lieb & Larned Sts., Detroit, Mich.

HAASE Motor Works, 1017 Lloyd St., Milwaukee, Wis.

HALL Gas Engine Mfg. Co., 431 S. Park Ave., Waukegan, Ill.

HARTFORD—See Gray & Prior Machine Co.

HARVARD Marine & Auto Co., 25 Eliot St., Cambridge, Mass.

HEINEL Co., H. A., Monroe & Fifth Sts., Wilmington, Del.

HERCULES Gas Engine Works, 351 Market St., San Francisco, Cal.

HILDRETH Mfg. Co., 703 Sheridan St., Lansing, Mich.

HILL, R. S., 24 E. Woodbridge St., Detroit, Mich. "Victor."

HITCHCOCK Gas Engine Co., Seaview Ave., Bridgeport, Conn.

HOFFMAN Launch & Motor Works, W., 1253 N. Halsted St., Chicago, Ill.

HOLLIDAY Mfg. & Engineering Co., 160 Bunker St., Chicago, Ill.

HOLMES Motor Co., West Mystic, Conn.

HOULE Motor Works, A. J., 570-82 South East St., Holyoke, Mass.

HUBBARD Motor Co., Middletown, Conn.

HUME, John T., 106 Third St., Des Moines, Ia.

HURD & Haggin, 316 Hudson St., New York, N. Y.

IMPERIAL Gas Engine Co., 60 Clementina St., San Francisco, Cal.

JAGER Co., Chas. J., 281 Franklin St., Boston, Mass.

JENCICK Motor Mfg. Co., Port Chester, N. Y.

JOHNSON Bros. Co., Terre Haute, Ind.

JOHNSON Motor Co., Chester, Pa.

JOHNSON & Wells Machine Co., Neenah, Wis.

JONES Co., S. M., Toledo, O. "Ralaco."

KAHLENBERG Bros., Two Rivers, Wis.

KEIDEL & Co., Henry, Baltimore, Md. "Ardmore."

KENNEBEC—See Torrey Roller Bushing Works.

KIRKHAM Motor Mfg. Co., Bath, N. Y.

KNEELAND Mfg. Co., Battle Creek, Mich.

KNOX—See Camden Anchor-Rockland Machine Co.

KOWALSKY Engine Co., J., Verona, Pa.

KUMBERGER & Vreeland, 33 Sullivan St., New York, N. Y. "Uncle Sam."

LACKAWANNA Mfg. Co., Newburgh, N. Y.

LACY—See Brown-Cochran Co.

LAMB Boat & Engine Co., Clinton, Ia.

LATHROP Co., J. W., Mystic, Conn.

LEADER—See Sintz-Wallin Co.

LEIGHTON, H. J., 901 Fayette St., Syracuse, N. Y.

LISK, Geo. A., 338 Scotten Ave., Detroit, Mich.

LITTLE GIANT—See United Mfg. Co.

LITTLE SAMPSON—See Sterling Machine & Stamping Co.

LOANE-HILTZ Engineering Co., 306 Hanover St., Baltimore, Md. "Fisherman."

LOZIER Motor Co., Broadway & 55th St., New York, N. Y.

MAJOR JONES—See Major Marine Gas Engine Co.

MAJOR Marine Gas Engine Co., 277 Jefferson Ave., E., Detroit, Mich. "Major Jones."

MARINE Power Company, 576 Grove St., Milwaukee, Wis.

MERCHANTS Engine Co., 38 Harrison St., Brooklyn, N. Y.

MERCURY Motor Co., Produce Exchange, New York, N. Y.

MIANUS Motor Works, Mianus, Conn.

MILLER Bros., 4036 Prairie Ave., Chicago, Ill.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MILWAUKEE Motor Co., 32d & Burleigh Sts., Milwaukee, Wis.

MINGST, C. P., 1230 Riverside Ave., Evansville, Ind.

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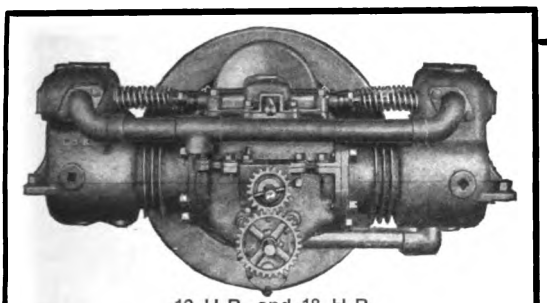


12 H.P. and 18 H.P.

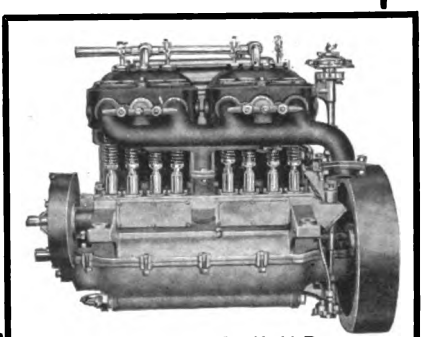
"Beaver" Motors

6 cylinder vertical $4\frac{3}{8}$ x $4\frac{3}{4}$.
4 cylinder vertical $4\frac{3}{8}$ x $4\frac{3}{4}$ and $4\frac{3}{4}$ x $5\frac{1}{4}$.
2 cylinder horizontal opposed $4\frac{3}{8}$ x 4 and $4\frac{3}{4}$ x 4 and $5\frac{1}{8}$ x $4\frac{1}{2}$.
4 cylinder horizontal opposed $5\frac{1}{8}$ x $4\frac{1}{2}$.
The 4 cylinder horizontal opposed motor is designed especially for commercial trucks.
Centre Crank Oiling device or Constant Level Splash System.
All motors 4 cycle.

Write for free booklet.

BEAVER MFG. CO.

789 Chase St., Milwaukee, Wis.



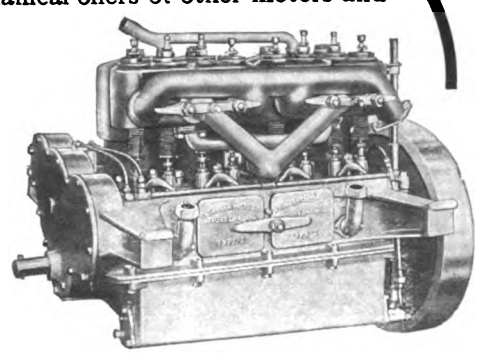
28-30 H.P. 35-40 H.P.

WAUKESHA MOTORS

SELF-CONTAINED OILING SYSTEM

The self-contained oil·ng system of **Waukesha Motors** dispenses with the independent mechanical oilers of other motors and makes improper oiling practically impossible. Cylinders are offset from the crank shaft.

Waukesha Motors are compact, singularly free from vibration and suitable in every way for hard, high-speed work. Provision for magneto. Made in the following sizes:



Type "I"—4" bore, 4" stroke
Type "A"—4¼" bore, 4¾" stroke
Type "H"—4¾" bore, 5" stroke
Type "J"—5" bore, 6" stroke

WAUKESHA MOTOR CO

Waukesha, Wis

CATALOGUE GIVING FULL DETAILS FREE. WRITE TO-DAY.

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MOTORS (Continued)

GASOLINE MARINE MOTORS (Continued)

MONARCH Motor Mfg. Co., 1592-1600 N. Halsted St., Chicago, Ill.

MOORE—See Palmer-Moore Co.

MORTON Marine Motor Co., Third & Milton Sts., Camden, N. J.

NEW London Motor Co., New London, Conn. "Pequot."

NEW York Yacht, Launch & Engine Co., Morris Heights, New York, N. Y. "20th Century."

NIAGARA—See Ducro Mfg. Co.

NORTH Chicago Machine Co., North Chicago, Ill.
(See page 429.)

ORIOLE—See Page Engineering Co.

PAGE Engineering Co., 119-21 E. York St., Baltimore, Md. "Oriole."

PALMER Bros., Coscob, Conn.

PALMER-MOORE Co., 315 E. Washington St., Syracuse, N. Y. "Moore."

PEERLESS—See Sibley-Houfley Machine Co.

PENNSYLVANIA Iron Works Co., Eddystone, Pa. "Globe."

PEQUOT—See New London Motor Co.

PERFECTION—See Caille Perfection Motor Co.

PERKINS & Co., Grand Rapids, Mich.

PIERCE Engine Co., 22-60 Clark St., Racine Wis.

PIGGINS Bros., Racine, Wis.

PORTAGE Boat & Engine Co., Portage, Wis

PORTER Engine & Machine Co., New Haven, Conn.

PORTO—See Waterman Marine Motor Co.

POTTER Mfg. Co., New Brunswick, N. J.

PROGRESSIVE Mfg. Co., 41 Norwood St. Torrington, Conn. "Eagle."

PUTNAM Motor Mfg. Co., 888 State St., Springfield, Mass.

RACINE Boat Mfg. Co., Muskegon, Mich.

RALAACO—See Jones Co.

RAMSEY Mfg. Co., 472 Bullitt Bldg., Philadelphia, Pa.

REFINED—See Thrall-Fishback Motor Co.

REGAL Gasoline Engine Co., Coldwater Mich.

ROBERTS Motor Co., Columbus Ave., Sandusky, O.

ROCHESTER Gas Engine Co., Rochester N. Y.

RUTENBER—See Western Motor Co.

SAGAMORE Engine Co., Sagamore St. Lynn, Mass.

SAGINAW Yacht & Motor Co., Saginaw Mich.

SAYRE Stamping Co., Sayre, Pa.

SCHAUB & Son, Machine Co., 3064 Henshaw Ave., Cincinnati, O.
(See page 429.)

SCHLOSSER Mfg. Co., 151 E. 126th St., New York, N. Y.
(See page 181.)

SCRIPPS Motor Co., 608 Trumbull Ave., Detroit, Mich.

SEITZ Co., F. A., 141 Frelinghuysen Ave. Newark, N. J.

SIBLEY-HOUFLEY Machine Co., 180 Brush St., Detroit, Mich. "Peerless."

SINTZ-WALLIN Co., 285 S. Front St., Grand Rapids, Mich. "Leader."

SMALLEY—See General Machinery Co.

SMITH & Baldridge Machine Co., 63 Amsterdam St., Detroit, Mich.

SNECKNER—See Stamford Motor Co.

SPARKS Machine Co., C. F., Alton, Ill.

SPAULDING Engine Co., St. Joseph, Mich

SPECIALTY Mfg. Co., 40 Water St., S. Norwalk, Conn.

SPEEDWAY—See Gas Engine & Power Co

STAMFORD Motor Co., Stamford, Conn "Sneckner."

STANDARD Gas Engine Co., 436 Market St., San Francisco, Cal.

STANDARD Motor Construction Co., 177 Whiton St., Jersey City, N. J.

STANLEY Co., 79 Milk St., Boston, Mass "Toquet."

STERLING Engine Co., 1250-60 Niagara St Buffalo, N. Y.

STERLING Engine Co., 29 S. Clinton St Chicago, Ill.

STERLING Machine & Stamping Co. Vermillion, O. "Little Sampson."
(See page 459.)

STORK Motor Co., Saginaw, Mich.

STRELINGER Co., Chas. A., Detroit, Mich

SYMPHONY Mfg. Co., 26-28 Franklin St., Detroit, Mich.

SYRACUSE Gas Engine Co., Syracuse, N. Y.

TEMPLE Pump Co., 15th St. & 15th Pl., Chicago, Ill.

TERMAAT & Monahan Co., Oshkosh, Wis.

THOUSAND Island Boat & Engine Co., Morristown, N. Y.

THRALL Fishback Motor Co., 45 Fort St. E., Detroit, Mich. "Refined."

TOLEDO Motor Co., 104 Ottawa St., Toledo, O. "Grasser."

TOQUET—See Stanley Co.

TORREY Roller Bushing Works, Bath, Me. "Kennebec."

TREBERT, H. L. F., 1122 St. Paul St., Rochester, N. Y.

TREBERT Gas Engine Co., 35 Ford St., Rochester, N. Y.

TROJAN Motor Co., 809 Nelson St., Louisville, Ky.

TRUSCOTT Boat Mfg. Co., St. Joseph, Mich

TUTTLE Co., D. M., Canastota, N. Y.

20TH CENTURY — See New York Yacht, Launch & Engine Co.

UNCLE SAM—See Kumberger & Vreeland.

UNITED Mfg. Co., 175 W. Woodbridge St., Detroit, Mich. "Little Giant."

VAN Auken Motor & Machine Works, Bridgeport, Conn.

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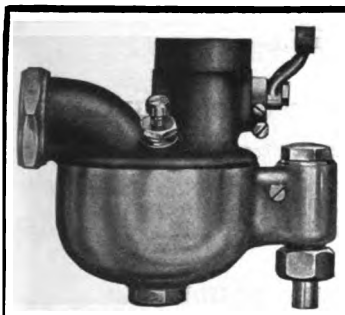
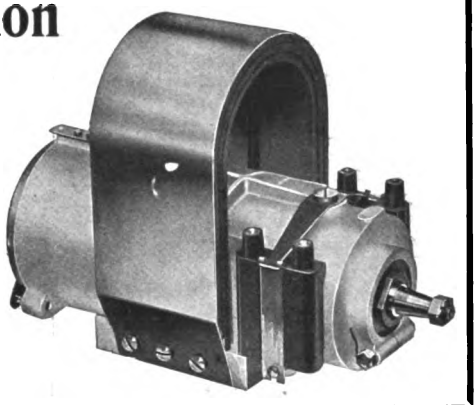


Holley Carburetor

50,000 in use. Has only one adjustment. No moving parts in the mixer chamber. Used by the Olds Motor Works, Mitchell Motor Car Co., T. B. Jeffery & Co., Wayne Automobile Co., and other prominent manufacturers

Holley High Tension Magneto



Price, $65. Takes the place of battery, spark coil and commutator. Armature revolves on Hess-Bright bearings. Imported German magnets used. Workmanship and materials used better than any device in the world.

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HOLLEY BROS. CO.
DETROIT, MICH.

Our 1909 Model

Triple Action Carburetor

We guarantee you 20 to 30 per cent. more power than is given you by any other carburetor.

It is the only carburetor in the world with which it is ABSOLUTELY IMPOSSIBLE TO FLOOD YOUR ENGINE by giving too rich a mixture, as no liquid gasoline is discharged from the carburetor, nothing but a perfectly dry gas, which starts your engine on the first turn.

NO SENSITIVE NEEDLE VALVE to regulate your gasoline. An absolutely flood-proof carburetor.

Fuel Record
1-2 Pint per H. P. Hour

Agents Wanted Everywhere.
Send for Catalogs.

Manufactured by

American Carburetor & Improvement Company

1660-1668 Bushwick Avenue
BROOKLYN, N. Y., U. S. A.

Branch Office
1814 Broadway, Brooklyn, N. Y.

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MOTORS (Continued)

GASOLINE MARINE MOTORS (Continued)

VICTOR—See Hill, R. S.

VIM Motor Mfg. Co., Sandusky, O.

WATERMAN Marine Motor Co., 1506-12 Fort St. W., Detroit, Mich. "Porto."

WATERTOWN Motor Co., 112 Moulton St., Watertown, N. Y.

WATKINS Co., Frank M., 525-31 Baymiller St., Cincinnati, O.

WAUKESHA Motor Co., Waukesha, Wis. (See page 185.)

WESTERN Launch & Engine Works, Michigan City, Ind.

WESTERN Motor Co., Logansport, Ind. "Rutenber." (See page 75.)

WILLET Engine & Carbureter Co., 766 Ellicott Sq., Buffalo, N. Y. (See page 183.)

WOLVERINE Motor Works, Foot of Union Ave., Bridgeport, Conn.

WRIGHT Motor Co., 48 S. Division St., Buffalo, N. Y.

KEROSENE MARINE MOTORS

ACME Oil Engine Co., Union Ave., near R. R., Bridgeport, Conn.

FAY & Bowen Engine Co., 92 Lake St., Geneva, N. Y.

GRAND Rapids Yacht & Engine Co., Grand Rapids, Mich.

INTERNATIONAL Oil Engine Co., Danielson, Conn.

MIETZ, A., 138 Mott St., N. Y. City.

NICHOLS Quadruple-Traction Vehicle & Power Co., Stamford, Conn.

REMINGTON Oil Engine Co., Stamford, Conn.

STEAM AUTOMOBILE MOTORS

(See Engines, Steam)

MOULDINGS

BRASS MOULDINGS

COWLES & Co., C., New Haven, Conn. (See page 143.)

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich. (See page 63.)

ENGLISH & Mersick Co., New Haven, Conn.

METAL Stamping Co., 243 West St., New York, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass. (See page 233.)

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

RUNNING BOARD MOULDINGS

(See also Mouldings, Brass; also Mouldings, Steel)

ENGLISH & Mersick Co., New Haven, Conn.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STEEL MOULDINGS

DAHLSTROM Metallic Door Co., Buffalo St. & Blackstone Ave., Jamestown, N. Y.

MUFFLERS

EXHAUST MUFFLERS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

ANTI-EXPLO—See Garage Equipment Co.

AUTO & Power Appliance Co., The Arcade, Cleveland, O.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 109.)

BYRNE, Kingston & Co., Kokomo, Ind. (See page 71.)

CHAMPION Mfg. Co., 9-15 Alling St., Newark, N. J.

EJECTOR—See Motor & Mfg. Works.

GARAGE Equipment Co., Milwaukee, Wis. "Anti-Explo."

GRAY-HAWLEY Mfg. Co., 608 W. Fort St., Detroit, Mich. (See page 289.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See page 455.)

KELLS Mfg. Co., W. J., 62-66 Van Winkle Ave., Jersey City, N. J. (See page 147.)

KINSEY Mfg. Co., Dayton, O. "Kinwood." (See page 143.)

KINWOOD—See Kinsey Mfg. Co.

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 490.)

LOOMIS Autocar Co., Westfield, Mass.

MOTOR & Mfg. Works Co., Middle St., Geneva, N. Y. "Ejector."

MOTSINGER Device Mfg. Co., 36 Main St., Pendleton, Ind.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y. (See page opposite.)

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y. (See page 147.)

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TWO CYLINDER OPPOSED AIR COOLED

MOTORS

Offset cylinders, straight connecting rods, mechanically operated valves. Sizes, 4" bore x 4" stroke, 4¼" bore x 4" stroke, 4⅜" bore x 4" stroke.

WRITE FOR COMPLETE DESCRIPTION AND PRICES

THE TIPPETT MFG. CO.

172-182 West Locust Street - - Columbus, Ohio

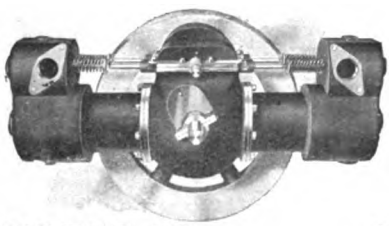
BEILFUSS AUTO MOTORS

SIZES:

18-20 H.P. 10-12 H.P.

Water Cooled.

Two-Cylinder Opposed.



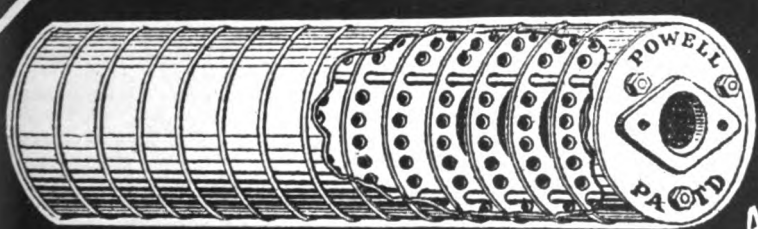
10-12 H.P.

Air Cooled.

Two-Cylinder Opposed.

Send for Circulars.

THE BEILFUSS MOTOR CO., LANSING, MICH.



Eliminates ALL Noise

POWELL PRESSED STEEL MUFFLER

THE BEST MUFFLER ON THE MARKET

The Most Practical Scientific Application. Quality and Workmanship Unexcelled.

This muffler is made up of a succession of pressed steel cups drawn from sheet metal of No. 16 gauge, each cup shouldered so that it overlaps the bottom of the succeeding one by ¼ of an inch. The number of cups used varying with the size of the engine to be muffled.

The end p ates are of heavily ribbed gray or malleable iron, with pipe or flange connection. The perforations are around the outer edge of each baffling plate with an additional one in the center of the first few. The area of these holes varying with the size of engine to be muffled.

In ordering state size of engine cylinder and number, size of exhaust pipe and whether standard pipe, steel or flanged connection is used.

POWELL MUFFLER & TIMER CO.

42 La Fayette Street UTICA, N. Y.

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MUFFLERS (Continued)

EXHAUST MUFFLERS (Continued)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SMITH & Co., D. B., Utica, N. Y. "Yankee."

SNOW, B. W., 132 Bissell St., Syracuse, N. Y.

TURNER Brass Works, Sycamore, Ill.

WEBSTER Muffler Co., Galesburg, Ill.

WEEBER Mfg. Works, C. F., Albany, N. Y.

WESTERN Motor Co., Logansport, Ind. (See page 75.)

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

XARDELL Co., J. A. & C. A., Utica, N. Y.

YANKEE—See Smith & Co.

THROAT MUFFLERS

SCOTT Muffler Co., 71 Gallia St., Portsmouth, O.

VISOR Knitting Co., 2016 Whirlpool Ave., Niagara Falls, N. Y.

WAY Muffler Co., 23d & Arch Sts., Philadelphia, Pa.

MUFFS

STEERING WHEEL MUFFS

MANDEVILLE Steering Wheel Muff Co., Bluffton, Ind.

NAILS

UPHOLSTERY NAILS

(See Tacks, Upholstery)

NIPPLES

PIPE NIPPLES

(See Fittings, Pipe)

PUMP NIPPLES

(See Connections, Tire Pump)

NUMBERS

LAMP NUMBERS

BALZER—See Monogram Crest & Sign Co.

MONOGRAM Crest & Sign Co., 1777 Broadway, New York, N. Y. "Balzer."

LICENSE NUMBERS OR HANGERS

ALUMINUM Mfg. Co., Two Rivers, Wis.

ASBURY, H. E., Oak Lane, Philadelphia, Pa.

AUTOMOBILE License Indicator Co., Lewisburg, Tenn. "Perfection."

BALTIMORE Enamel & Novelty Co., foot of Allen St., Baltimore, Md.

BOYLE & Co., John, 112-14 Duane St., N. Y. City.

BURROWES Co., E. T., Portland, Me. (See page 277.)

CHILDS & Co., S. D., 200 S. Clark St., Chicago, Ill.

DUNN Co., Thos. J., Chambers St., cor. Church St., New York, N. Y. (See page 179.)

EMPIRE Dash & Fender Mfg. Co., 208 E. 38th St., New York, N. Y.

FINE, Horace E., 19 E. State St., Trenton, N. J.

GREACON & Co., Walter, 12 Mechanic St., Newark, N. J.

INDIANAPOLIS Dash Co., 2116 S. Meridian St., Indianapolis, Ind.

INGRAM-RICHARDSON Mfg. Co., Beaver Falls, Pa.

McKINNON Dash Co., Black Rock Station, Buffalo, N. Y. (See page 107.)

MONOGRAM Crest & Sign Co., 1777 Broadway, New York, N. Y.

MURDOCK Co., Jas., Jr., 116 Opera Place, Cincinnati, O.

NEW Jersey Aluminum Co., 701 Springfield Ave., Newark, N. J.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

PERFECTION—See Automobile License Indicator Co.

REES, F. H., Steele Memorial Bldg., Elmira, N. Y.

ROBBINS Mfg. Co., John, 58 Kneeland St., Boston, Mass.

ROYAL Enameling & Stamping Works, Desplaines, Ill.

STAFFORD Co., N., 67 Fulton St., New York, N. Y. "Stevenson."

STEVENSON—See Stafford Co.

STILLMAN & Engel, 164 Duane St., New York, N. Y.

WHITEFORD & Co., Jos. G., 23-27 N. Jefferson St., Chicago, Ill.

NUTS

LOCK NUTS AND WASHERS

(For Standard Nuts—See Bolts, Machine)

ALLISON Mfg. Co., Philadelphia, Pa.

BORDER Bolt & Nut Lock Co., Richmond, Ind.

COLUMBIA Nut & Bolt Co., 1550 Railroad Ave., Bridgeport, Conn.

EUREKA Nut Lock Co., 32nd & Smallman Sts., Pittsburg, Pa.

Complete Index to Classification appears on Pages 7 to 18.

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HARTFORD JOINTS for 1909

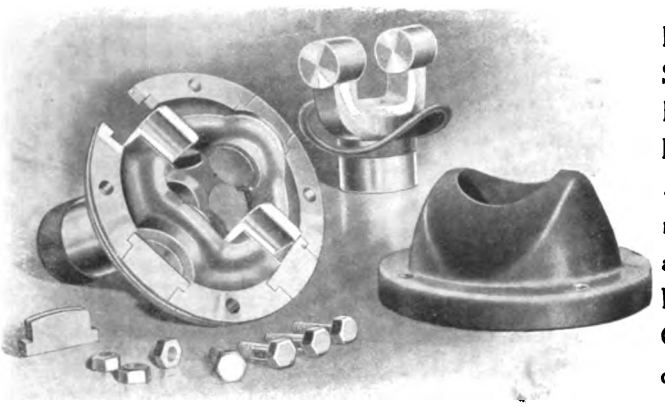
ARE STANDARD

HARTFORD AUTO PARTS CO., HARTFORD, CONN.

J. S. BRETZ CO., TIMES BUILDING, NEW YORK,

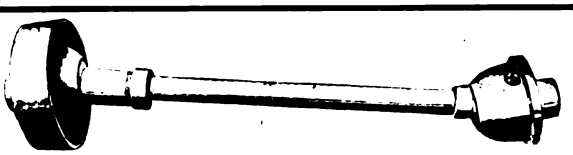
SELLING AGENTS.

Durable, Dust-Proof, Oil-tight, Drop Forged from best "Crank-shaft" Steel.



Bearing Surfaces Hardened. Note the simple method of assembling. Get our quotations.

SPICER SPICER



SPICER UNIVERSAL JOINTS

The Standard for Strength and Durability

51 TYPES and SIZES

Only the very best material is used—Steel Drop Forgings being used for all parts under stress of Power Transmission. All bearings are hardened and accurately ground, and all parts are interchangeable. Lubrication is practically perfect; joints will outwear the rest of the car.

Every Way the Best Joint on the Market

Simple, Durable, Efficient, Compact
Dust-Proof, Oil-Tight

WRITE for PRICES

K. F. Peterson, 166 Lake St., Chicago

Spicer Universal Joint Co., 15 Madison Ave. Plainfield, N. J.

SPICER SPICER

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NUTS (Continued)

LOCK NUTS AND WASHERS (Continued)

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. "Jones." (See page 451.)

GRIP Nut Co., Old Colony Bldg., Chicago, Ill.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

HOBBS Mfg. Co., Worcester, Mass. (See page 445.)

JONES—See Fowler Brass Works.

NATIONAL Elastic Nut Co., Milwaukee, Wis.

NATIONAL Lock Washer Co., Johnson & Hermon Sts., Newark, N. J. (See page opposite.)

POSITIVE Lock Washer Co., Newark, N. J. (See page opposite.)

SPIRAL Nut Lock Co., 156 Broadway, New York, N. Y.

WALKER Bros. Co., 216 Walton St., Syracuse, N. Y. "Victor." (See page opposite.)

VICTOR—See Walker Bros. Co.

THUMB OR WING NUTS

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

CHICAGO Screw Co., 519 Homan Ave., Chicago, Ill.

COLUMBUS Bolt Works, Columbus, O.

CORBIN Screw Corp., New Britain, Conn.

EBERHARD Mfg. Co., Tennyson St. & C. & P. R. R., Cleveland, O.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

KEYSTONE Drop Forge Works, Chester, Pa.

MICHIGAN Bolt & Nut Works, foot Meldrum Ave., Detroit, Mich.

PENINSULAR Miller Screw Co., 751 Bellevue Ave., Detroit, Mich.

PHILADELPHIA Machine Screw Works, 624 Race St., Philadelphia, Pa.

RHODE Island Tool Co., Providence, R. I.

ST. LOUIS Screw Co., 3017 N. 13th St., St. Louis, Mo.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 214 Foster Ave., Elyria, O.

WHITMAN & Barnes Mfg. Co., Chicago, Ill.

OILS

LUBRICATING OILS

(See Lubricants)

PACKING

ASBESTOS AND FIBROUS PACKING

BRANDT, Randolph, 70 Cortlandt St., New York, N. Y.

CRANDALL Packing Co., Palmyra, N. Y.

EAGLE Oil Supply Co., 104 Broad St., Boston, Mass.

GARLOCK Packing Co., Palmyra, N. Y.

HART Packing Co., Boston, Mass.

JOHNS-MANVILLE Co., H. W., 100 William St., New York, N. Y.

KEASBY & Mattison Co., Ambler, Pa.

MORGAN & Wright, Detroit, Mich. (See page 271.)

PEARSON & Co., J. H., 122 Centre St., New York, N. Y.

ROBERTSON & Sons, Jas. L., 48 Warren St., New York, N. Y.

SALL Mountain Asbestos Mfg. Co., 68 S. Canal St., Chicago, Ill.

METALLIC PACKING

(See Gaskets, Metallic)

RUBBER PACKING

AMERICAN Steam Packing Co., 51 High St., Boston, Mass.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Co., San Francisco, Cal.

BRANDT, Randolph, 70 Cortlandt St., New York, N. Y.

CANFIELD Mfg. Co., 1112 Noble St., Philadelphia, Pa.

COMBINATION Rubber & Belting Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J.

CONTINENTAL Rubber Works, 19th & Erie Sts., Erie, Pa.

CRANDALL Packing Co., Palmyra, N. Y.

CRESCENT Belting & Packing Co., Trenton, N. J.

EAGLE Oil & Supply Co., 104 Broad St., Boston, Mass.

EMPIRE Rubber Mfg. Co., Trenton, N. J.

GARLOCK Packing Co., Palmyra, N. Y.

GOODSELL Packing Co., 23 S. Canal St., Chicago, Ill.

GUTTA Percha & Rubber Mfg. Co., 126 Duane St., New York, N. Y.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HART Packing Co., Boston, Mass.

HOME Tire Co., Trenton, N. J. (See page 505.)

KNOWLTON Rubber Co., Geo. W., 88 Broad St., Boston, Mass.

MANHATTAN Rubber Mfg. Co., 18 Vesey St., New York, N. Y.

Complete Index to Classification appears on Pages 7 to 18.

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"National Rip"

Washers That Lock and Stay Locked

All sizes and weights for locking and holding nuts tight on bolts on all parts of automobiles; also effective in preventing machine screws from working loose.

GUARANTEED SUPERIOR TO ANY OTHERS

Samples furnished free for test

The NATIONAL LOCK WASHER CO.

Johnson and Hermon Streets, Newark, N. J.

529 MONADNOCK BLOCK, CHICAGO, ILL.

"National Bevel"

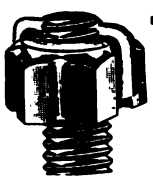
Positive

The POSITIVE Lock Washer

Plain

Made in all sizes and weights for Automobile purposes. Can be used thinner than any other lock washer — effective, no matter how thin. One lock under the nut and head can be used if so desired. Exhaustive tests, covering a period of nearly 12 years on railroad track, drop presses, Automobiles and machinery subject to vibration, have proven its superiority over every nut lock manufactured. *Write for samples and price.*

POSITIVE LOCK WASHER CO., Newark, N. J.



The "VICTOR" LOCK NUT

It is Practical and Positive
Efficient and Economical

NO LOST NUTS WHERE THE "VICTOR" IS USED

A practical, positive lock between nut and bolt—

Adapted to every class of machinery—

Used wherever a nut is liable to come off—

Its simplicity is its strong point—

No jam nuts— No washers—

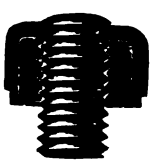
The "Victor" is not a spring lock—

The "Victor" is not a compression lock—

The "Victor" Lock Nut is a standard-sized nut, made in two classes, cold-punched and machined, and tapped, U. S. S. and A. L. A. M. standard.

Key is not a spring but made up shaped of annealed wire and furnished with all nuts.

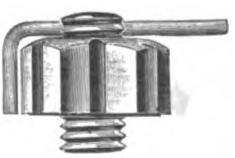
The "Victor" is the simplest and most effective with more advantages than any other Lock Nut device.



WALKER BROS. CO.

216 Walton Street

SYRACUSE, N. Y., U. S. A.



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PACKING (Continued)

RUBBER PACKING
(Continued)

MATTSON Rubber Co., Lodi, N. J. **(See page 151.)**

MECHANICAL Rubber Co., C. & P. R. R., near Nickel Plate R. R., Cleveland, O.

MORGAN & Wright, Detroit, Mich. **(See page 271.)**

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

PITTSBURG Steam Packing Co., 210 Second St., Pittsburg, Pa.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O. **(See page 269.)**

REVERE Rubber Co., 77 Bedford St., Boston, Mass.

ROBERTSON & Sons, Jas. L., 48 Warren St., New York, N. Y.

STOKES Rubber Co., Jos., Trenton, N. J.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J. "Vulcanoid." **(See page 45.)**

VOORHEES Rubber Mfg. Co., Jersey City, N. J.

VULCANOID—See Trenton Rubber Mfg. Co.

WILLIAMSON & Co., 123 Liberty St., New York, N. Y.

PADS

LICENSE PADS

(See Numbers, License)

PAINTS

PAINTS AND COLORS

ACME White Lead & Color Works, Detroit, Mich.

ADAMS & Elting Co., 155 Washington Blvd., Chicago, Ill.

BESCO—See Buffalo Enamel & Stain Co.

BILLINGS-CHAPIN Co., Cleveland, O.

BUCKEYE Paint & Varnish Co., Toledo, O.

BUFFALO Enamel & Stain Co., 501 D. S. Morgan Bldg., Buffalo, N. Y. "Besco."

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "King."

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E. Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 108 Fulton St., New York, N. Y.

DITZLER Color Co., 18 W. Baltimore Ave., Detroit, Mich.

FELTON, Sibley & Co., 136-140 No. 4th St., Philadelphia, Pa.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

HILDRETH Varnish Co., 90 West St., N. Y. City.

JOHNSTON Paint Co., 226 Main St., Cincinnati, O.

KING—See Chicago White Lead & Oil Co.

LUCAS & Co., John, Race & 4th Sts., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y. **(See page 289.)**

MOUND City Paint & Color Co., 811-13 N. Sixth St., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NICE, Eugene E., 272-74 S. Second St., Philadelphia, Pa.

PATTERSON-SARGENT Paint Co., Prospect & Huron Sts., Cleveland, Ohio.

PIERCE Co., F. O., New York, N. Y.

ST. LOUIS Surfacer & Paint Co., St. Louis, Mo. **(See page opposite.)**

SCHRACK & Co., C., 152 No. 4th St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, 45 Broadway, New York, N. Y.

UHLICH & Co., Paul, 81 Fulton St., New York, N. Y. (Importers) (Colors only).

VALENTINE & Co., New York, N. Y. **(See page 291.)**

WILLEY CO., C. A., Hunter's Point, New York, N. Y. **(See page opposite.)**

ALUMINUM AND BRONZE PAINTS

AMERICAN Bronze Powder Mfg. Co., 132 Church St., New York, N. Y.

ARNSTEIN, Eugene, 35th St. & Shields Ave., Chicago, Ill.

BINSWANGER & Co., B., 115 N. Fourth St., Philadelphia, Pa.

BRONZE Powder Works, 93 William St., New York, N. Y. "Ideal," "Vulcan."

CULLEN & Co., F. C., 704 W. Lake St., Chicago, Ill.

ENGEL & Co., John, 137 W. Broadway, New York, N. Y.

GELSTENDORFER Bros., 231 E. 42nd St., New York, N. Y.

IDEAL—See Bronze Powder Works.

KEMP Co., W. H., 165 Spring St., New York, N. Y.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

VULCAN—See Bronze Powder Works.

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WILLEYS SUPERFINE SPECIALTIES C CO & CH R COLORS
TRADE MARK

C. A. Willey Company

HUNTER'S POINT

NEW YORK CITY

Manufacturers of...

COLORS

Especially for....

AUTOMOBILES

and Filling-up Specialties for Both Metal and Wood Bodies

TRADE ST. LOUIS SURFACER SPECIALTIES MARK

Gear and Body (Metal) Surfacer

PRODUCING THE SMOOTHEST GROUNDWORK FOR AUTOMOBILE GEARS AND BODIES

Will not become brittle like leads, being

MORE ELASTIC

AND WILL

But hard enough to hold up the

Minerals, oxides and most fillers, therefore

MORE DURABLE

NOT CRACK

varnish, showing its natural gloss

Mr. Manufacturer: Do you want Surfacers that have no merit, or do you want a Surfacer that is ALL MERIT? If so, get in touch with

ST. LOUIS SURFACER & PAINT CO.

MAKERS -- ST. LOUIS, U. S. A.

The Quality of our Surfacers insures their life and durability.
Color Card and Prices furnished promptly. Write to-day

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PAINTS (Continued)

ENAMEL PAINTS

ACME White Lead & Color Works, Detroit, Mich.

ADAMS & Elting Co., 155 Washington Blvd., Chicago, Ill.

ARNSTEIN, Eugene, 35th St. & Shields Ave., Chicago, Ill.

BESCO—See Buffalo Enamel & Stain Co.

BUFFALO Enamel & Stain Co., 501 D. S. Morgan Bldg., Buffalo, N. Y. "Besco."

CHAVANT & Co., C. H., 203 Caton Ave., Jersey City, N. J. "Vesuvine."

DETROIT White Lead Works, 530-60 Milwaukee Ave., E. Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 103 Fulton St., New York, N. Y.

FELTON, Sibley & Co., 136-140 North Fourth St., Philadelphia, Pa.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GLIDDEN Varnish Co., Rockefeller Bldg., Cleveland, O.

MASURY & Son, John W., New York, N. Y.
(See page 289.)

PATTERSON-SARGENT Paint Co., Prospect and Huron Sts., Cleveland, O.

SCHRACK & Co., C., 152 N. Fourth St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

STANDARD Varnish Works, 29 Broadway, New York, N. Y.

VALENTINE & Co., New York, N. Y.
(See page 291.)

VESUVINE—See Chavant & Co.

EXHAUST PIPE AND MUFFLER PAINTS

C. O. T.—See Tingley & Co.

LASTIC—See Morris Paint Co.

MORRIS Paint Co., Cleveland, O. "Lastic."

TINGLEY & Co., Chas. O., Rahway, N. J. "C. O. T."

PANELS

CHARGING PANELS AND SWITCHBOARDS

ANDRAE & Sons, Julius, 225 W. Water St., Milwaukee, Wis.

CUTLER-HAMMER Mfg. Co., 12th & St. Paul Sts., Milwaukee, Wis.

GENERAL Electric Co., Schenectady, N. Y.

KRANTZ Mfg. Co., H., Brooklyn, N. Y.

LA ROCHE Co., F. A., New York, N. Y.

LEONARD Electric Co., Ward, Bronxville, N. Y.

MARCUSON, E., 521 W. 182d St., New York, N. Y. "Witham."

METROPOLITAN Switchboard Co., New York, N. Y.

SCHUREMAN & Co., J. L., Chicago, Ill.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WIRT Electric Co., 3108 Germantown Ave., Philadelphia, Pa.

WITHAM—See Marcuson, E.

WOOD PANELS

ACME Veneer Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J.
(See page 53.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

LOUISVILLE Veneer Mills, 940 Fulton St., Louisville, Ky.

OHIO Scroll & Lumber Co., Covington, Ky.

WOODMAN, Joel H., 15th, Clinton & Grand Sts., Hoboken, N. J.

PANS

DRIP PANS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

CROSBY Co., Buffalo, N. Y.
(See page 249.)

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.

DURLACH, I., 54 Vesey St., New York, N. Y.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See page 455.)

HILL Dryer Co., Worcester, Mass.

KILBOURNE & Jacobs Mfg. Co., Congress & Lincoln Sts., Columbus, O.

KINSEY Mfg. Co., Dayton, O.
(See page 143.)

MULLINS Co., W. H., 124 Franklin St., Salem, O.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

STANDARD Auto Specialty Co., 56 Boerum St., Brooklyn, N. Y.

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WORCESTER Pressed Steel Co., Barbers Crossing, Mass.
(See page 339.)

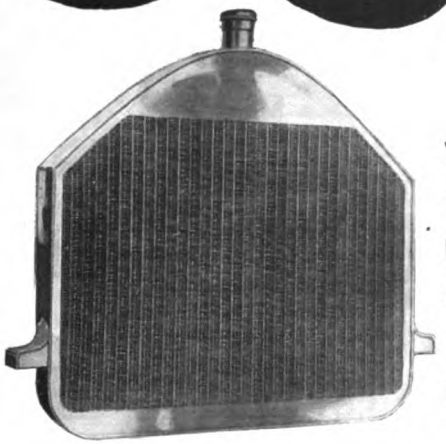
WRIGHT Cooler & Hood Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

Complete Index to Classification appears on Pages 7 to 18.

BUSH

RADIATORS



HIGH GRADE

WE MAKE ALL KINDS OF SHEET METAL PARTS

Bush Manufacturing Co

HARTFORD, CONN.

IN 1909
FISK TIRES
will be furnished
to fit any rim

THE FISK RUBBER COMPANY
Chicopee Falls, Mass.
Branches in 17 cities

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PANS (Continued)

DUST PANS OR UNDER BONNETS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

FEDDERS Mfg. Works, Buffalo, N. Y. (See page 485.)

KINSEY Mfg. Co., Dayton, O. (See page 143.)

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 454-53 E. 173d St., New York, N. Y. (See page 147.)

WILSON-WELLMAN Mfg. Co., 1444 E. 49th St., Cleveland, O.

WRIGHT Cooler & Hood Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODYEAR Tire & Rubber Co., Akron, O. (See page opposite.)

GRAYS—See Standard Leather Washer Mfg. Co.

HARTFORD Rubber Works Co., Hartford, Conn.

M. & M. Mfg. Co., Akron, O. (See page 38.)

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

MORGAN & Wright, Detroit, Mich. (See page 271.)

MYHTIB Composition Co., 286 Asylum St., Hartford, Conn. (See page 439.)

O'NEILL Tire & Protector Co., Buchtel Ave., Akron, O.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

TINGLEY & Co., Chas. O., Rahway, N. J.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J. (See page 45.)

PAPER

FRICTION PAPER

(See Frictions, Fibre)

PASTE

HAND PASTE

(See Soaps, Hand)

POLISHING PASTE

(See Polishes, Metal)

SOLDERING PASTE

(See Flux, Soldering)

PATCHES

TIRE REPAIR PATCHES

(See also Shoes, Inner Tire, also Sleeves, Tire Repair)

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

COX, David H., Rahway, N. J.

DIAMOND Rubber Co., Akron, O.

EMPIRE Automobile Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENNIS Rubber Mfg. Co., Commercial St., Newark, N. J. (See page opposite.)

PATTERNS

AUTOMOBILE PATTERN MAKERS

BALKWILL Pattern Works, 1449 E. 49th St. Cleveland, O.

FORSYTH Pattern Co., Youngstown, O.

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

MODEL Pattern Works, Washington & Perry Sts., Buffalo, N. Y.

PEELER, W. F., Goshen, Ind.

PENN Pattern Works, Chester, Pa.

STANDARD Pattern Works, Detroit, Mich.

PEDALS

HORN AND CUT OUT PEDALS

GARAGE Equipment Co., Milwaukee, Wis.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GRAY-HAWLEY Mfg. Co., 608 W. Fort St., Detroit, Mich. (See page 289.)

RATCHET PEDALS

(For locking brakes, etc.)

GARAGE Equipment Co., Milwaukee, Wis. "Perfect."

PERFECT—See Garage Equipment Co.

READING Automobile Co., 26 S. Fifth St., Reading, Pa. "Victor."

TURNER Brass Works, Sycamore, Ill.

VICTOR—See Reading Automobile Co.

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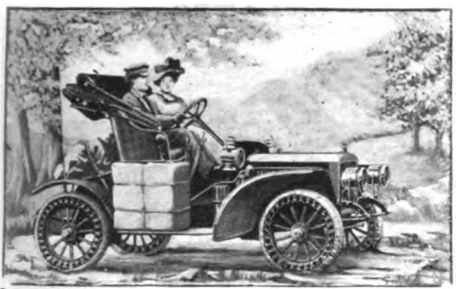

Seventeen Hundred Miles on Rough Rocky Mountain Roads and Good as New.

"Regarding the Woodworth Treads purchased some time ago will say that they have given perfect satisfaction, having covered 1,700 miles, over one-half of which was rough and rocky mountain climbing in southern Oregon. They still look nearly as good as new and I removed a section of one a few days ago and you would not think from the appearance that the rubber had been used at all. These treads have been carrying a good load as the Mitchell runabout with my camp outfit weighed 3,000 pounds. It is a pleasure for me to say a good word for the treads and for myself I would not think of using my car over rough roads without them."—F. E. Wray, Dealer in Furniture, Carpets, Matting, Wall Paper, etc., Silverton, Oregon.

Woodworth Treads are made in all sizes for all kinds of tires. Prices $8.00 to $25.00. Send for new circular.

LEATHER TIRE GOODS CO.,
Newton Upper Falls, Mass.

"Off Agin, On Agin, Gone Agin"—*in Less Than a Minute*

You can take off the Goodyear Detachable Auto-Tire with the Goodyear Universal Rim—or put it on—in less than sixty seconds by the watch, and you *won't need any special tools.* With your fingers take off the valve cap, then remove the valve nut with an ordinary wrench push the valve stem up into the tire as shown in the cut—pull off the locking ring and outer flange—then slide tire off. Put it back the same way. No prying, no wedging, no work.

The Goodyear Universal Rim will take any other standard clincher, or detachable, as well as the Goodyear Tire. It banishes all tire troubles. The

GOODYEAR Auto-Tire on Universal Rim

can't rim-cut can't creep—can't develop mud boils or sand blisters. There are reasons. Write for our booklet, "How to Select an Auto-Tire." It answers all the "whys" by pictures and full description. Call at any one of our branches or agencies in the following cities, or at our factory.

The Goodyear Tire & Rubber Company
Trade Street, Akron, Ohio

BRANCHES AND AGENCIES: Boston, 261 Dartmouth St.; Cincinnati, 317 E. Fifth St.; Los Angeles, 932 S. Main St.; Philadelphia, 1404 Ridge Ave.; New York, 64th St. and Broadway; San Francisco, 506 Golden Gate Ave.; Chicago, 82-84 Michigan Ave.; Cleveland, 2005 Euclid Ave.; Milwaukee, 190-196 Eighth St.; St. Louis, 712-714 Morgan St.; Buffulo, 719 Main St.; Detroit, 251 Jefferson Ave.; Pittsburg, 5988 Center Ave.; Seattle, 2001 Second Ave.; Omaha, 2020-2022 Farnam St.

Quality Service

Pure Para Rubber Tubes

ENNIS

AUTOMOBILE MOTOR CYCLE BICYCLE

TIRES

FRICTIONED FABRICS AND REPAIR MATERIAL

Ennis Rubber Mfg. Co.
COMMERCIAL STREET,
Newark, N. J.

and Satisfaction

Repair Men, Send for Prices

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PINIONS

METAL AND RAWHIDE PINIONS

(See Gears)

PINS

COTTER PINS

AKRON Machine Co., Akron, O.

BROOKS & Sons, M. S., Chester, Conn.

COBB & Drew, Plymouth, Mass.

HINDLEY Mfg. Co., Valley Falls, R. I.

JENCKES Mfg. Co., Pawtucket, R. I.

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

PICKERING, R. S., Sharon Hill, Pa.

SACO—See Smith & Co.

SMITH & Co., F. P., 114 Railroad Ave., Sharon Hill, Pa. "Saco."
(See page 355.)

WHITAKER Mfg. Co., Chicago, Ill.
(See page 377.)

WHITMAN & Barnes Mfg. Co., Chicago, Ill.

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

PIPE

WROUGHT IRON AND STEEL PIPE

BYERS & Co., A. M., Pittsburg, Pa.

CRANE Co., 519 S. Canal St., Chicago, Ill.

HARRISBURG Pipe & Pipe Bending Co., Harrisburg, Pa.

LA BELLE Iron Works, Steubenville, O.

LONGMEAD Iron Co., Conshohocken, Pa.

MARK Mfg. Co., Evanston, Ill.

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

READING Iron Co., Reading, Pa.

SOUTH CHESTER Tube Co., Chester, Pa.

SPANG, Chalfant & Co., Wood St. & Fourth Ave., Pittsburg, Pa.

WESTERN Tube Co., Kewanee, Ill.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

PIPING

EXHAUST AND INTAKE PIPING

(See Manifolds, Exhaust)

PLATES

NAME PLATES

ABBOTT, W. H., 1263 Broadway, N. Y. City.

ALUMINUM Mfg. Co., Two Rivers, Wis.

AMERICAN Name Plate & Mfg. Co., 224 Kinzie St., Chicago, Ill.

BALTIMORE Enamel & Novelty Co., Ft. of Allen St., Baltimore, Md.

BECKER Engraving Co., August, 247 Atlantic Ave., Boston, Mass.

BERNARD Co., J., 477-79 Tenth Ave., New York, N. Y.

BLACKINGTON & Co., V. H., Attleboro Falls, Mass.

BLISS Mfg. Co., E. C., 91 Sabin St., Providence, R. I.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CHANDLER Co., 31 Taylor St., Springfield, Mass.
(See page 367.)

CHICAGO Steel & Brass Works, 1706 Fisher Bldg, Chicago, Ill.

CHILDS & Co., S. D., 200 S. Clark St., Chicago, Ill.

CROWE Name Plate & Engraving Co., Grace St. & E. Ravenswood Park, Chicago, Ill.

DETROIT Rubber Stamp Co., 90 Griswold St., Detroit, Mich.

EASTWOOD Wire Mfg. Co., Belleville, N. J.

ENGLISH & Mersick Co., New Haven, Conn.

ELECTRO-CHEMICAL Engraving Co., 450 19th St., Brooklyn, N. Y.

GREACON & Co., Walter, 12 Mechanic St., Newark, N. J.

GREENDUCK Co., 200 S. Clinton St., Chicago, Ill.

HANSON, C. H., 44 S. Clark St., Chicago, Ill.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

MONOGRAM Crest & Sign Co., 1777 Broadway, New York, N. Y.

MORSE & Son, C. H., 13 So. Water St., Rochester, N. Y.

MURDOCK-SHAW Co., 125 Federal St., Boston, Mass.

MURDOCK Co., Jas., Jr., 116 Opera Place, Cincinnati, O.

NEW YORK Stencil Works, 100 Nassau St., New York, N. Y.

NEWARK Brass Plate Engraving Co., 45-49 Lawrence St., Newark, N. J.

QUINT & Sons, S. H., 15 So. 4th St., Philadelphia, Pa.

REES, F. H., Steele Memorial Bldg., Elmira, N. Y.

ROBBINS Mfg. Co., John, 58 Kneeland St., Boston, Mass.

ROGERS, C. E., 34 Beach St., Boston, Mass.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STAFFORD Co., N., 67 Fulton St., New York City.

TURNER Brass Works, Sycamore, Ill.

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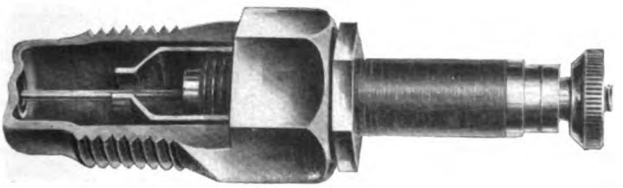
Ignition Troubles Overcome by using Spark Plugs built on scientifically and practically correct principles.

'Shoots a Flame"

Sectional view of the Cleveland Spark Plug. Price, $2.00.

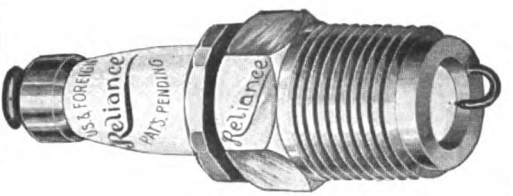
The Cleveland Spark Plug, on account of its peculiar construction, acts as a powerful condenser, greatly increasing the intensity of the spark with a minimum of battery consumption. The perfect insulation surface of the Cleveland Spark Plug, being protected by the spiral action, **cannot carbonize, or short-circuit.**



Blue Blaze Plug. Price, $1.50.

OUR "BLUE BLAZE" SPARK PLUG cannot carbonize, or short-circuit under any condition, because it is a double plug, "a plug within a plug," forming an inner chamber that carbon cannot enter, and which gives added protection to the insulation, thus overcoming the usual soot, oil and carbon troubles. Write to-day for our new Catalog.

The Cleveland Spark Plug Co. **1140 Power Ave.,** **Cleveland, O.**



This Is A Fair Test

Try the plug you are using, we don't care what make, in a glass of water. If it sparks you don't want our plug, for yours is infallible, and never causes any trouble. *But if it don't* you need our plug and need it bad, for you never will enjoy *perfect ignition* until you use a plug that will *spark in water.*

ITS PROOF OF INFALLIBILITY

MANUFACTURERS: It is the plug you have been looking for.
DEALERS: It is the plug your trade will appreciate.

Write for catalog and prices.

JEFFERY DEWITT CO., 224 High St., Newark N. J.

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PLATES (Continued)

NAME PLATES (Continued)

WALTER & Sons, N. C., 194 William St., New York, N. Y. (See page 493.)

WHITEFORD & Co., Jos. G., 23-27 N. Jefferson St., Chicago, Ill.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

PLATING

BRASS AND NICKEL PLATING

BRIDGEPORT Electro Plating Co., 125 Kossuth St., Bridgeport, Conn.

HILLMAN Plating & Auto Supply Co., 446 Tremont St., Boston, Mass.

HOLT & Beebee, 40 Sudbury St., Boston, Mass.

IDEAL Plating Co., Marlboro, Mass. (See page 365.)

NEHLS Plating Works, 248 Brush St., Detroit, Mich.

TRESAL Bronzing & Plating Co., 245-47 W. 28th St., New York, N. Y.

PLATINUM

(See also Points, Sparking)

AMERICAN Platinum Works, 251 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J. (See page 455.)

BISHOP & Co., J., Malvern, Pa.

CROSELMIRE & Ackor Co., 40 Walnut St., Newark, N. J.

DEE & Co., Thos. J. D., 67-69 Washington St., Chicago, Ill.

GOLDSMITH Bros. Smelting & Refining Co., Heyworth Bldg., Chicago, Ill.

PLATT, C. S., New York, N. Y.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y. (See page 455.)

PLUGS

CHARGING PLUGS AND RECEPTACLES

ANDERSON Mfg. Co., Albert & J. M., 289 A St., Boston, Mass.

SPARK PLUGS

ACME Telephone & Mfg. Co., Albia, Iowa.

AJAX—See Auto Specialties Mfg. Co.

ALBRIGHT Spark Plug Co., Columbus, Ga.

ALL-IN-ONE—See Comet Electrical Mfg. Co.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Electric Fuse Co., Muskegon, Mich.

ANDERSON Spark Plug Co., 100 Boylston St., Boston, Mass.

APPLE—See Dayton Electrical Mfg. Co.

ARC Spark Mfg. Co., 125 W. 32d St., New York, N. Y. "W. E. B."

ARTIZAN BRASS CO., 204 Lincoln Park Blvd., Chicago, Ill.

AUTO-MARINE—See Legnard Bros.

AUTO Specialties Mfg. Co., 656-58 Third St., Milwaukee, Wis. "Ajax," "Meteor."

BAKER Mfg. Co., East & Chapel Sts., New Haven, Conn. (See page 455.)

BEAT-EM-ALL—See Mosler & Co.

BENFORD Mfg. Co., E. M., Mount Vernon, N. Y. "Monarch." (See page 207.)

BEST Ignition Equipment Co., 1900 Broadway, New York, N. Y.

BLAKE Electrical Co., 888 Purchase St., Boston, Mass. "Red Cross." (See page 417.)

BOUGIE-MERCEDES—See Herz & Co.

BREECH BLOCK—See Standard Co.

BROWN—See Progressive Mfg. Co.

CAMPBELL, H. F., 5 Park Sq., Boston, Mass. "Hot Spark."

CENTERFIRE—See General Accumulator & Battery Co.

CHAMPION Co., Albert, 38 Whittier St., Boston, Mass. (See page 413.)

CHAMPION Igniter Co., Flint, Mich.

CHARTER & Co., Hoopeston, Ill.

CHICAGO Motor Specialties Co., 3096 N. Clark St., Chicago, Ill.

CIRKLE-FYRE—See Mica Core Mfg. Co.

CLEVELAND Spark Plug Co., 1140 Power Ave., Cleveland, O. (See page 201.)

COMET—See Oakes & Dow Co.

COMET Electrical Mfg. Co., Detroit, Mich. "All-in-One."

DAYTON Electrical Mfg. Co., 32 N. St. Clair St., Dayton, O. "Apple."

DELTA Mfg. Co., Bloomfield, N. J.

DIABLO—See Mica Core Mfg. Co.

DIAMOND—See Westchester Appliance Co.

DIEBEL, Wm., 935-37 N. Seventh St., Philadelphia, Pa. "Flash Light."

DIEN, Ch., 43-45 W. 34th St., New York, N. Y. (Importer.) "Edco." "Luthi."

DOW Portable Electric Co., Adams St., Braintree, Mass.

EDGAR Mfg. Co., 104 Hanover St., Boston, Mass. "Newport."

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PENNSYLVANIA
OVERLAND
SELDEN
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NEW YORK TRANSPORTATION CO.
NEW YORK TAXICAB CO.
YORK PULLMAN
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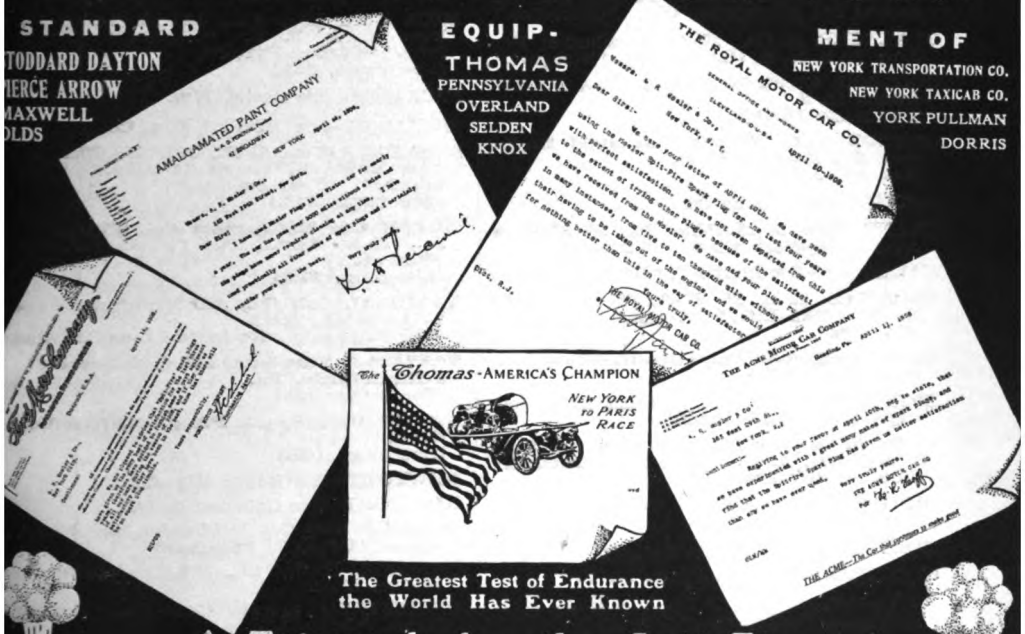

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that ACTUALLY Spit Fire

INSIST ON THE GENUINE, with Name on Porcelain and Base

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PLUGS (Continued)

SPARK PLUGS (Continued)

EDISON Auto Accessories Co., 49 Christopher St., New York, N. Y. (See page 417.)

ELBRIDGE Electric Co., Elbridge, N. Y.

ELECTRIC Goods Mfg. Co., 115 Purchase St., Boston, Mass.

EMPIRE—See Grant Mfg. & Machine Co.

FISCHER Ignition Co., 2076 Reading Rd., Cincinnati, O. "Standard."

FLASH LIGHT—See Diebel, Wm.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRY—See Standard Sales Co.

FULMER, C. F., 415 Sycamore St., Plainfield, N. J.

GENERAL Accumulator & Battery Co., 152 Second St., Milwaukee, Wis. "Centerfire."

GLAENZER & Co., 26-28 Washington Pl., New York, N. Y. (Importers). "Nieuport."

GOODSON Electric & Mfg. Co., Providence, R. I. (See page 101.)

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass. (See page 437.)

GOTHAM—See Hardy Co.

GRANT Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn. "Empire."

HADES, Jr.—See Igniter Appliance Co.

HARDY Co., R. E., 25 W. 42d St., New York, N. Y. "Sta-Rite," "Venus," "Vulcan," "Gotham."

HEINZE Electric Co., Lowell, Mass. (See page 231.)

HERBERT, W. H., 3312 Wabash Ave., Chicago, Ill. "Little Giant."

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. "Bougie-Mercedes." (See yellow insert.)

HIGH Frequency Ignition Coil Co., 2309 S. Main St., Los Angeles, Cal. "Seeley."

HOLSTEN—See Triumph Engineering Co.

HOT SPARK—See Campbell, H. F.

HUB Lubricator Co., 78 Portland Bldg., Boston, Mass. "Wiley."

HUFF Co., E. S., 69 Woodward Ave., Detroit, Mich.

IGNITER Appliance Co., 309 Electric Bldg., Cleveland, O. "Hades Jr.," "Reflex."

JEFFERY-DEWITT Co., 224 High St., Newark, N. J. "Reliance." (See page 201.)

JEWELL—See Pittsfield Spark Coil Co.

K-W Ignition Co., 35 Power Ave., Cleveland, O. "Vim." (See page 175.)

KINGSTON—See Kokomo Electric Co.

KOKOMO Electric Co., Kokomo, Ind. "Kingston." (See page 469.)

LAVALETTE & Co., 112-14 W. 42d St., New York, N. Y. (Importers). (See page 479.)

LEGNARD Bros., 729 N. Genesee St., Waukegan, Ill. "Auto-Marine."

LEHMAN Mfg. Co., J. H., 170 Broadway, New York, N. Y. (See red insert.)

LIPMAN Mfg. Co., 210 Pleasant St., Beloit, Wis.

LITTLE GIANT—See Herbert, W. H.

LOCKWOOD Ash Motor Co., 210 W. Cortland St., Jackson, Mich.

LONG Bros., Kokomo, Ind. (See page 399.)

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J. (See page 115.)

LUTHI—See Dien, Ch.

McCANNA Mfg. Co., 58 N. Jefferson St., Chicago, Ill. (See page 509.)

McCORD & Co., Detroit, Mich. (See page 423.)

MEPHISTO—See Mica Core Mfg. Co.

METEOR—See Auto Specialties Mfg. Co.

MEZGER, C. A., 1629 Broadway, New York, N. Y. "Soot Proof."

MICA Core Mfg. Co., 444 E. 166th St., New York, N. Y. "Diablo," "Mephisto," "Cirkle-Fyre." (See page 495.)

MICA-POR—See Roche, Wm.

MONARCH—See Benford Mfg. Co.

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y. "Spit Fire." "Triumph." "Beat-em-all." (See page 203.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). "Power." (See page 179.)

NATIONAL Coil Co., 420 Michigan Ave., E. Lansing, Mich. (See page opposite inside front cover.)

NAYLOR & Bingham, 417 Commerce St., Philadelphia, Pa. (See page 409.)

NEVER-MISS Spark Plug Co., Lansing, Mich. (See page 101.)

NEWPORT—See Edgar Mfg. Co.

NIEUPORT—See Glaenzer & Co.

OAKES & Dow Co., 15 Chardon St., Boston, Mass. "Comet." "Sootless."

ORSWELL Igniter Co., 192 Commercial St., Boston, Mass.

PITTSFIELD Spark Coil Co., Dalton Mass. "Jewell." (See page 95.)

POINT—See Smith, Fred W.

POWER—See Motor Car Equipment Co.

PROGRESSIVE Mfg. Co., 41 Norwood St., Torrington, Conn. "Brown."

RAJAH Auto Supply Co., Watsessing Station, Bloomfield, N. J. (See page 449.)

RED CROSS—See Blake Electric Co.

REFLEX—See Igniter Appliance Co.

REFLEX Ignition Co., 2128 E. Second St., Cleveland, O. (See page 329.)

RELIANCE—See Jeffery-Dewitt Co.

RICH-SPARK—See Richardson Engineering Co.

ROBERT Instrument Co., 49 Shelby St., Detroit, Mich.

ROCHE, Wm., 287 Clerk St., Jersey City, N. J. "Mica-Por."

Complete Index to Classification appears on Pages 7 to 18.

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¶ They are far superior to *any* plug on the market. They are practically self-cleaning and will not foul. This insures "sweet" running. Reduces cost for plugs to less than half, and increases efficiency. You don't have to guess the gap distance—the micrometer adjustment permits of setting the spark gap to a KNOWN DISTANCE—to 1-1000 of an inch. Send $1.00 for a trial plug.

Mission oak, brass trimmed case with orders for five or seven plugs. Each plug *guaranteed* for one year.

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PLUGS (Continued)

SPARK PLUGS (Continued)

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Satan."

SATAN—See Sager Co.

SCHENECTADY Spark Plug Co., 1259 State St., Schenectady, N. Y. (See page 101.)

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich. (See page 97.)

S. G. E.—See Standard Gas Engineering Co.

SEELEY—See High Frequency Ignition Coil Co.

SHAIN, Chas. D., 70 Murray St., New York, N. Y. (See page 265.)

SHARPE Co., J. & W., 731 Vincent St., Cleveland, O.

SHERMAN & Son, G. H., 419 St. Aubin Ave., Detroit, Mich.

SMITH, Fred W., Aberdeen, S. D. "Point."

SHUR-FIRE—See Igniter Appliance Co.

SOOT PROOF—See Mezger, C. A.

SOOTLESS—See Oakes & Dow Co.

SPIT FIRE—See Mosler & Co.

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 433.)

STANDARD—See Fischer Special Mfg. Co.

STANDARD Gas Engineering Co., 106 Main St., Bradford, Pa. "S. G. E."

STANDARD Co., Torrington, Conn. "Breech Block." (See page 409.)

STANDARD Sales Co., 1964 Broadway, New York, N. Y. "Fry." (See page 399.)

STA-RITE—See Hardy Co.

STERLING—See Windsor Mfg. Co.

STRANG Supply Co., Lewis, 1912 Broadway, New York, N. Y. (See page 497.)

TRIUMPH—See Mosler & Co.

TRIUMPH Engineering Co., 226 Lafayette St., New York, N. Y. "Holsten."

TWO-SPOT Mfg. Co., 75 Centre St., Canastota, N. Y. (See page 329.)

UKO—See Utility Co.

UTILITY Co., 639 W. 44th St., New York, N. Y. "Uko." (See page 241.)

VENUS—See Hardy Co.

VIM—See K.-W. Ignition Co.

VULCAN—See Hardy Co.

W. E. B.—See Arc Spark Mfg. Co.

WACHMAN Auto Mfg. & Supplies, 872 Michigan Ave., Detroit, Mich. (See page 209.)

WENDTLAND, W., 216 Centre St., New York, N. Y. (See page 405.)

WESTCHESTER Appliance Co., Ludlow Station, Yonkers, N. Y. "Diamond."

WICO—See Witherbee Igniter Co.

WILEY—See Hub Lubricator Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WINDSOR Mfg. Co., 30 Hermon St., Worcester, Mass. "Sterling."

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico." (See page 205.)

TIRE REPAIR PLUGS

APSTEIN Mfg. Co., D., Bridgeport, Conn. "Permanent." (See page 403.)

AUTO Goods Co., 95 Milk St., Boston, Mass. "Cinch."

CINCH—See Auto Goods Co.

DIAMOND Rubber Co., Akron, O.

HARTFORD Rubber Works Co., Hartford, Conn.

GOODRICH Co., B. F., Akron, O.

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

PERMANENT—See Apstein Mfg. Co.

TINGLEY & Co., Chas. O., Rahway, N. J.

POINTS

SPARKING POINTS

(See also Platinum)

AMERICAN Platinum Works, 251 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J. (See page 455.)

BOKER & Co., Herman, 101 Duane St., New York, N. Y. (Importers). "Meteor."

CROSELMIRE & Ackor Co., 40 Walnut St., Newark, N. J.

MANHATTAN Dental Co., Times Bldg., New York, N. Y.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y. (See page 455.)

QUEEN & Co., 8th & Arch Sts., Philadelphia, Pa.

POLISHES

AUTOMOBILE BODY POLISHES

(See also Soaps, Automobile)

ADAMS & Elting Co., 155 Washington Boulevard, Chicago, Ill.

AUTO Shine Co., Buffalo, N. Y.

AUTOSHINE—See Royal Polish Co.

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WORLD FAMOUS

"Monarch" Porcelain
List price, $1.00

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Equip your product right when it leaves your factory—with the "BENFORD" Plugs — They will add to the reliability of your cars and build up the reputation you would have them acquire. Write for special manufacturers prices.

The "Monarch" Mica
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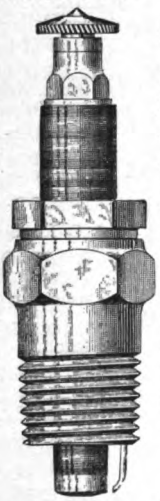

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Handle the "BENFORD" and profit and reputation is assured. "BENFORD" products find ready sale, and can be handled with good profit and absolute confidence—and that means much to you. Write for special prices.

"Monarch" Magneto Plug,
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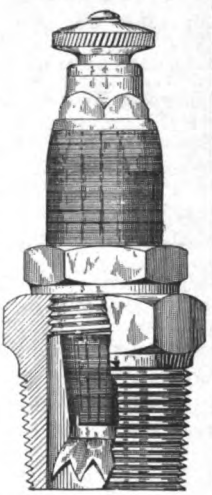

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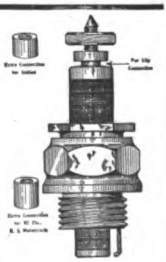

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POLISHES (Continued)

AUTOMOBILE BODY POLISHES (Continued)

AUTO-KLEAN—See Lucas & Co., John.

BAILEYS—See Crown Mfg. Co.

BUFFALO Oil, Paint & Varnish Co., Buffalo, N. Y.

BUFFALO Specialty Co., 373 Ellicott St., Buffalo, N. Y. "Liquid Veneer." (See page 239.)

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa.

COLUMBIA Lubricants Co., 116 Broad St., New York, N. Y. (See page 165.)

CROWN Mfg. Co., 407 S. Illinois St., Indianapolis, Ind. "Baileys."

GLISTENER Mfg. Co., 622 Cypress St., Kansas City, Mo. "Lee's."

HOLLINGSHEAD Co., R. M., Camden, N. J.

JEWEL Mfg. Co., Chicago, Ill.

KLENZENE Co., 1710-1712 Market St., Philadelphia, Pa

KOONSHINE—See St. Louis Surfacer & Paint Co.

LEE'S—See Glistener Mfg. Co.

LEVO—See Stanley, John T.

LIQUID VENEER—See Buffalo Specialty Co.

LUCAS & Co., John, Race & Fourth Sts., Philadelphia, Pa. "Auto-Klean."

M. & V.—See Morhous Mfg. Co.

MAJESTIC—See Royal Lubricating Oil Co.

MATS—See Weiss Polish Works.

MEXICAN Mfg. Co., 239 S. Market St., Wichita, Kans.

MODOC Co., Foot of Market St., Chester, Pa.

MORHOUS Mfg. Co., Detroit, Mich. "M. & V." (See page 241.)

NEWBERN Co., S. C., 430 Walnut St., Philadelphia, Pa.

NOXALL Polish Mfg. Co., 1238 Belmont Ave. Philadelphia, Pa.

O. K.—See Sheppard, W. S.

P. N. S. Co., 2031-33 N. 29th St., Philadelphia, Pa.

PERUVIAN—See Sweet, Chas. F.

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y. "Majestic."

ROYAL Polish Co., 301-303 W. 63d St., Chicago, Ill. "Autoshine."

ST. LOUIS Surfacer & Paint Co., St. Louis, Mo. "Koonshine." (See page 195.)

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J. "O. K."

SHOVE & Gage Co., Caesar Misch Bldg., Providence, R. I. "U-Auto."

STANLEY, John T., W. 30th St., New York, N. Y. "Levo."

SWEET, Chas. F., Pearl & Haynes Sts., Hartford, Conn. "Peruvian."

U-AUTO—See Shove & Gage Co.

WEISS Polish Works, 46 E. Van Buren St., Chicago, Ill. "Mats."

METAL POLISHES

ACME Polish Co., 810 Second Ave., Pittsburg, Pa. "Ayrolite," "Rising Sun."

ADAMS & Elting Co., 155 Washington Blvd., Chicago, Ill. "Auto Bright."

ADRO Co., 108 Fulton St., New York, N. Y.

ALBRIGHT—See Hassler Co.

AL-LECTRO—See Allen Co.

ALLEN Co., L. B., Monadnock Blk., Chicago, Ill. "Al-lectro."

AMALIE—See Sonneborn Sons.

AMERICAN Metal Polish Co., 89 Winslow Ave., West Somerville, Mass. "Putz. "Silva Putz. "Red Cross."

AMERICAN—See Harvey Chemical Co.

AMERICAN Oil & Disinfectant Co., 262 Pearl St., New York, N. Y. "Sparrow."

ANCHOR—See Hoffman Co.

A-O-K—See Ulrich & Co.

ARMSTRONG Co., T. W., 120-22 Liberty St., New York, N. Y. "Monarch."

AUTO BRIGHT—See Adams & Elting Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich.

AUTO-SHINE—See Paul & Co.

AUTO Specialty Co., 330 N. Illinois St., Indianapolis, Ind. "Klean Cutter."

AYROLITE—See Acme Polish Co.

B-BRITE—See Missouri Chemical Co.

BAILEYS—See Crown Mfg. Co.

BAUR Bros, 677 Summit Ave., Jersey City, N. J.

BELL Mfg. Co., 113 Morgan St., St. Louis, Mo. "Star."

BLUE RIBBON—See International Metal Polish Co.

BOTT Bros. Mfg. Co., 166 N. High St., Columbus, O. "Nays."

BUFFALO Specialty Co., 373 Ellicott St., Buffalo, N. Y. "Shinebright." (See page 239.)

BURNISHINE—See Paul & Co.

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa. "Winterton."

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

CHILDS Co., G. B., 499 Greenwich St., New York, N. Y.

CLEANER Mfg. Co., 2842 Olive St., St. Louis, Mo. "Polishine."

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa. "Spe-De-Shyne."

CROSS, W. H., 162 Chambers St., New York, N. Y.

CROWN—See Rex Chemical Co.

CROWN Mfg. Co., 407 S. Illinois St., Indianapolis, Ind. "Baileys."

CROWN Soap Co., 1941-43 W. Fayette St., Syracuse, N. Y. (See page 241.)

EAGLE Mfg. Co., 383 Prospect St., Cleveland, Ohio.

Complete Index to Classification appears on Pages 7 to 18.

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WOULD YOU WEAR A CHEERFUL GRIN?

USE

"GLOBE" METAL POLISH

IT DOES THE WORK; ON EITHER HOT OR COLD METAL THE RESULTS ATTAINED ARE UNBEATABLE

RAIMES & CO. NEW YORK

"NON-SUCH"

METAL POLISH

FOR AUTOMOBILES

More Chauffeurs are using "NON-SUCH" than any other brand. Specially prepared for all brass fixtures on automobiles. Compounded both White and Black. Put up in all sizes from the Half-Pint to the gallon size.

On sale by all the Leading Motor Supply Dealers.

WHOLESALE AND RETAIL

Manufactured only by

Hercules Chemical Works

693 W. Van Buren St., Chicago

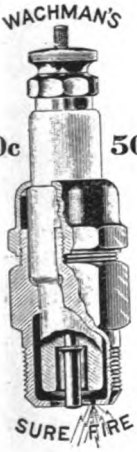
Also Manufacturers of the celebrated "NON-SUCH" Lacquers. For use on all metals.

50c "SURE FIRE" SPARK PLUG 50c

WACHMAN'S

Has all the Efficiency of any High Priced Plug on the Market

50c



50c

SURE FIRE

Everybody is asking how we can make the "Sure Fire" and sell it at this unheard of price of 50 cents and still make money. We are enabled to do this because we are building them in lots of 50,000, which at once cuts the cost of production; and our extensive sales at a small margin give us in the end a satisfactory gain. We are the latest makers of spark plugs, have profited by the experiences of others, and have succeeded in overcoming the obstacles they have had to contend with.

GUARANTEED against any defects. The "Sure Fire" will not foul, burn out, or short circuit. It is built for hard service, and will always give you positive ignition. **50c each.** Postage prepaid. Special discounts to dealers. **50c each.**

Wachman Auto Manufacturing and Supplies

372 Michigan Avenue

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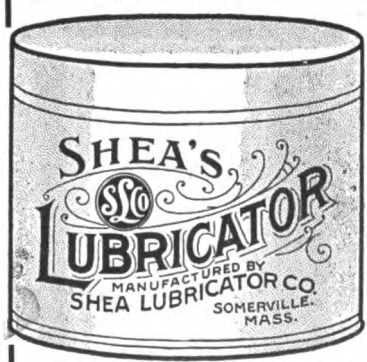
SHEA'S

MOTOR and AXLE LUBRICATOR

A graphite grease for Automobiles and Motor Boats, one-fourth quantity of which will run three times as many miles as other greases.



A Test will Prove it.

TRY IT

Highest Quality and most Economical.

Works equally well Summer and Winter.

MANUFACTURERS: This is the grease to send out on your car because it gives better results.

DEALERS: This is the grease to sell because it wears better, gives better satisfaction and affords you good profit. Write for full particulars and prices.

SHEA LUBRICATOR CO.

82 Partridge Avenue Somerville Mass.

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POLISHES (Continued)

METAL POLISHES (Continued)

FAIRCHILD & Bro., M. H., 199 Michigan St., Chicago, Ill.

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

GLITTERSHINE—See Grady Mfg. Co.

GLOBE—See Raimes & Co.

GOLDEN GLITTER—See Mooney, Arthur J.

GOLDEN SCEPTRE—See Rath Mfg. Co.

GRADY Mfg. Co., 614-16 W. 39th St., New York, N. Y. "Glittershine," "National," "Putz," "Uno," "Scouree."

HARVEY Chemical Co., Lafayette, Ind. "American."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I. "Scouree." (See back cover.)

HASSLER Co., Owen C., 565 W. Fullerton Ave., Chicago, Ill. "Albright."

HERCULES Chemical Works, 693 W. Van Buren St., Chicago, Ill. "Non-Such." (See page 209.)

HINDS & Coon, 124-26 Pearl St., Boston, Mass. "Ruby-Rub."

HOFFMAN Co., J. W., 8 Medford St., Boston, Mass. "Anchor."

HOFFMAN, Geo. W., 551 E. Washington St., Indianapolis, Ind. "U. S."

HYGLO—See Stanley, John T.

IDEAL—See Walsh & Co.

IMPERIAL—See Rath Mfg. Co.

INTERNATIONAL Metal Polish Co., Indianapolis, Ind. "Blue Ribbon." (See page 241.)

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KLEAN CUTTER—See Auto Specialty Co.

KOONSHINE—See St. Louis Surfacer & Paint Co.

KORTUM Mfg. Co., Attica, N. Y. "Zircon."

LEADER Mfg. Co., 1808 Chestnut St., St. Louis, Mo.

LORD Polish Co., F. T., 52 Dickinson St., Cambridge, Mass. "Lumino."

LUMINO—See Lord Polish Co.

LUSTRE Chemical Co., 811 Woman's Temple. Chicago, Ill.

LUSTRAL—See Standard Leather Washer Mfg. Co.

M & V—See Morhous Mfg. Co.

MACLEAN-BRANDON Oil & Supply Co., 65 Long Wharf, Boston, Mass. "Nox-All."

MAGIC—See Sweet, Chas. F.

MARVEL—See Rex Chemical Co.

MEXICAN Mfg. Co., 239 S. Market St., Wichita, Kan. "Venus."

MISSOURI Chemical Co., Holden, Mo. "B-Brite."

MODOC Co., foot of Market St., Chester, Pa.

MONARCH—See Armstrong Co.

MOONEY, Arthur J., 359-63 Ninth Ave., New York, N. Y. "Golden Glitter."

MORHOUS Mfg. Co., Detroit, Mich. "M. & V." (See page 241.)

NATIONAL—See Grady Mfg. Co.

NAYS—See Bott Bros. Mfg. Co.

NEWBERN Co., S. C., 430 Walnut St., Philadelphia, Pa.

NON-SUCH—See Hercules Chemical Works.

NOX-ALL—See Maclean-Brandon Oil & Supply Co.

NOXAL Polish Mfg. Co., 1238 Belmont Ave., Philadelphia, Pa.

PAUL & Co., J. C., 59 Dearborn St., Chicago, Ill. "Auto-Shine," "Burnishine."

POLESHINE—See Cleaner Mfg. Co.

PRESTOSHINE—See Sheppard, W. S.

PURITAN Soap Co., 502 Exchange St., Rochester, N. Y.

PUTZ—See American Metal Polish Co.

PUTZ—See Grady Mfg. Co.

RAIMES & Co., New York, N. Y. "Globe." (See page 209.)

RATH Mfg. Co., Hancock & Hedley Sts., Philadelphia, Pa. "Imperial," "Golden Sceptre," "Staraline."

RED CROSS—See American Metal Polish Co.

RED CROSS—See Robertson & Co.

REX Chemical Co., S. Howard St., Baltimore, Md. "Crown." "Vels-ma." "Marvel."

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Star."

RISING SUN—See Acme Polish Co.

ROBERTSON & Co., 324 W. Madison St., Chicago, Ill. "Red Cross." (See page 497.)

ROYAL Lubricating Oil Co., 116 Broad St.,

RUBY-RUB—See Hinds & Coon.

ST. LOUIS Surfacer & Paint Co., St. Louis, Mo. "Koonshine." (See page 195.)

SCOUREE—See Grady Mfg. Co.

SCOUREE—See Harris Oil Co.

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J. "Prestoshine."

SHINEBRIGHT—See Buffalo Specialty Co.

SHINEBRIGHT—See Shove & Gage Co.

SHOVE & Gage Co., Caesar Misch Bldg., Providence, R. I. "Shinebright."

SILVA PUTZ—See American Metal Polish Co.

SWEET, Chas. F., Pearl & Haynes Sts., Hartford, Conn. "Magic."

SOLARINE Co., 5-7 N. Carpenter St., Chicago, Ill.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie." (See page opposite.)

SPARROW—See American Oil & Disinfectant Co.

SPEARE'S Sons Co., Alden, 369 Atlantic Ave., Boston, Mass.

SPE-DE-SHYNE—See Cleanola Co.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Lustral."

STANLEY, John T., W. 30th St., New York, N. Y. "Hyglo."

STAR—See Bell Mfg. Co.

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Comes to America with a Reputation from Europe

"AMALIE"

NON-CARBON
AUTOMOBILE
OILS AND GREASES

THE FINEST IN THE WORLD

Since the origin of the automobile abroad our European houses have supplied the leaders of motor car trade with our oils and greases.

The high quality of our product was recognized, and because of its superiority over the numerous so-called automobile oils, was adopted by such representative firms as

Panhard & Levassor; Charron, Girardot & Voigt; A. Darracq & Co.; M. Berliet; Rochet & Schneider; Daimler Co.; De Dietrich & Co., and a great many others abroad and in America.

Our wide international success is a guarantee of our ability to fill your oil requirements most satisfactorily.

"AMALIE" Non-Carbon Cylinder Oils are of guaranteed purity, insuring longest wear and perfect lubrication, are of high flash point and will not carbonize at any temperature to which they will be subjected.

We also make the famous "AMALIE" Body and Metal Polishes and Soaps

DEALERS: Every dealer and garage in the United States and Canada should be interested in our proposition. It's a big money and reputation maker. In your own interest write to us—write to-day.

L. SONNEBORN SONS, Inc.

Fulton and Pearl Streets **NEW YORK**

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POLISHES (Continued)

METAL POLISHES (Continued)

STAR—See Richmond & Co.

STARALINE—See Rath Mfg. Co.

TAYLOR Mfg. Co., 468 Main St (Charlestown), Boston, Mass.

U. S.—See Hoffman, Geo. W.

ULRICH & Co., Buffalo, N. Y. "A-O-K."

UNO—See Grady Mfg. Co.

UTILITY Co., 639 W. 44th St., New York, N. Y.
(See page 241.)

VELS-MA—See Rex Chemical Co.

VENUS—See Mexican Mfg. Co.

WALSH & Co., John F., 28 Renne Ave., Pittsfield, Mass. "Ideal."

WINTERTON—See Callery & Co.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.
(See page 383.)

ZIRCON—See Kortum Mfg. Co.

PORCELAIN

BRUNT Porcelain Works, G. F., S. Market St., E. Liverpool, O.

DIAMOND Porcelain Co., Chauncey St., Trenton, N. J.

GARY Co., Theodore H., 50 Franklin St., New York, N. Y. (Importers). "Isolit."
(See page 151.)

HARTFORD Faience Co., Hartford, Conn.

IMPERIAL Porcelain Works, Mulberry St. & New York Ave., Trenton, N. J.

ISOLIT—See Gary Co.

NATIONAL Porcelain Co., Trenton, N. J.

PASS & Seymour, Solvay, N. Y.

STANDARD China Works, Trenton, N. J.

STAR Porcelain Co., Trenton, N. J.

PRIMERS

GASOLINE ENGINE PRIMERS

BALDWIN—See Primer Co.

LOCKWOOD Bros., 101 W. Pearl St., Jackson, Mich.
(See page 427.)

PRIMER Co., 58 Front St., Worcester, Mass. "Baldwin."

PROPS

CAR PROPS OR SUPPORTS

(See Jacks, Car Supporting)

PROTECTORS

SLEEVE AND CUFF PROTECTORS

GILBERT Mfg. Co., New Haven, Conn.
(See page 265.)

GORDON—See Vehicle Apron & Hood Co.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."
(See page 135.)

TIRE PROTECTORS

(See Treads, Detachable; also Shoes, Inner Tire)

PUMPS

ENGINE DRIVEN TIRE PUMPS

AUTO Pump Co., Springville, N. Y. "Spencer."

B. B.—See Herz & Co.

DELPAUCH—See Nightingale Whistle Mfg. Co.

EBERMAN Auto Appliance Co., 1205 Monadnock Block, Chicago, Ill.

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. "B. B."
(See yellow insert.)

NIGHTINGALE Whistle Mfg. Co., 1693 Broadway, New York, N. Y. (Importers.) "Delpauch."
(See page 149.)

PACIFIC Tucking & Mfg. Co., 471-473 18th St., Brooklyn, N. Y. "P. T. C."

P. T. C.—See Pacific Tucking & Mfg. Co.

ROHRBACKER Automatic Air Pump Co., Blaine, Wash.
(See page 147.)

RUNG—See Whitmer & Rung.

SAFETY Air Pump Co., 327 Jefferson Ave., Detroit, Mich.

SPENCER—See Auto Pump Co.

TILEY-PRATT Co., Essex, Conn.

WHITMER & Rung, 200 Girard Trust Bldg., Philadelphia, Pa. "Rung."

WRAY Pump & Register Co., 191-93 Mill St., Rochester, N. Y.

HAND TIRE PUMPS

ARTIZAN Brass Co., 204 Lincoln Park Blvd., Chicago, Ill. "Savety."

BINKS—See Star Brass Works.

BRIDGEPORT Brass Co., 253 Broadway, New York, N. Y. "Stapley."
(See page 215.)

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COLONIAL Brass Co., 316-318 Seneca St., Cleveland, O.

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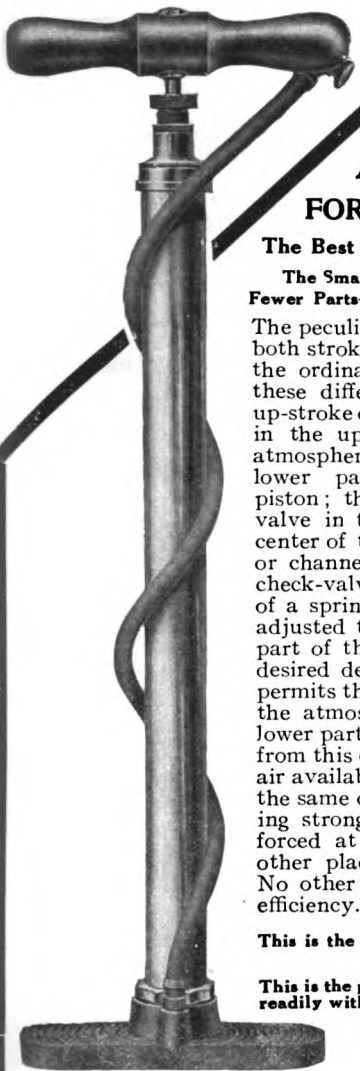


A NEW AIR-PUMP

FOR INFLATING TIRES

The Best Ever Designed for the Purpose.

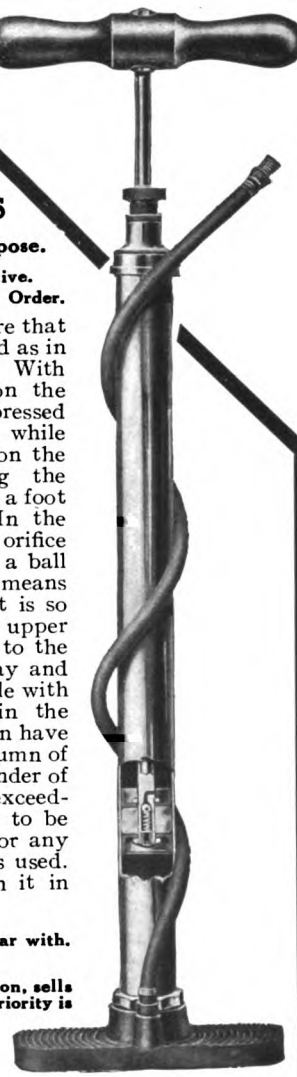
The Smallest, Lightest and Most Effective.
Fewer Parts—Less Liable to Get Out of Order.

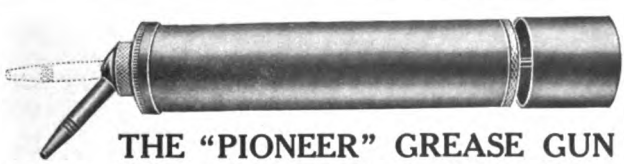
The peculiar features of this pump are that both strokes of the pump are utilized as in the ordinary double-action pump. With these differences and advantages on the up-stroke of the pump the air is compressed in the upper part of the cylinder, while atmospheric air is being taken in on the lower part immediately following the piston; the air is admitted through a foot valve in the base of the pump. In the center of the piston rod there is an orifice or channel, the lower end contains a ball check-valve; the ball is seated by means of a spring and threaded sleeve; it is so adjusted that when the air in the upper part of the cylinder is compressed to the desired density the spring gives way and permits the compressed air to mingle with the atmospheric air accumulated in the lower part of the cylinder; we then have from this equalizing of the air a column of air available equal to a double cylinder of the same dimensions, this gives an exceeding strong column of air available to be forced at one stroke into the tire or any other place for which the pump is used. No other pump can compare with it in efficiency.

MANUFACTURERS
This is the pump you should equip your car with.

DEALERS
This is the pump you can make big money on, sells readily with just a little pushing, its superiority is so evident.

Write for Prices





THE "PIONEER" GREASE GUN

A grease gun of special excellence in design, material and construction. Will lift the heaviest grease with ease and discharge it at any angle. The lightest oil can be used as well as the heaviest grease. Must be seen to be appreciated. Samples sent on request and special prices to dealers and auto manufacturers. We also make

"RAYFLEX" STANDARD DRY CELLS (Highest Grade Products)

"RAYFLEX" FLASH LIGHTS For Autos and Boats

WRITE TO US

THE STANDARD SHEET METAL CO., PASSAIC, N. J.

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PUMPS (Continued)

HAND TIRE PUMPS (Continued)

ELITE Mfg. Co., Ashland, O. "Reliable." (See page 153.)

EUREKA—See Judd & Leland Mfg. Co.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y. (See page opposite.)

GRAYS—See Standard Leather Washer Mfg. Co.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. "Wixon." (See page 63.)

JUDD & Leland Mfg Co., Clifton Springs, N. Y. "Eureka."

KELLOGG, JR.—See Wray Pump & Register Co.

LEATHER & Brass Mfg. Co., Auburn, N. Y.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. (See page 157.)

MILLER Mfg. Co., Peekskill, N. Y.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers.) (See page 179.)

NOERA Mfg. Co., Griggs St., Waterbury, Conn. "Perfect." "Red Devil." "Wonder."

PERFECT—See Noera Mfg. Co.

RED DEVIL—See Noera Mfg. Co.

RELIABLE—See Elite Mfg. Co.

SAVETY—See Artizan Brass Co.

SHAWVER Co., Springfield, O. "Springfield."

SKINNER & Skinner, Chicago, Ill. (See page opposite.)

SPRINGFIELD—See Shawver Co.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

STANDARD Sheet Metal Co., Delaware Ave., Passaic, N. J. (See page 213.)

STAPLEY—See Bridgeport Brass Co.

STAR Brass Works, 12-14 S. Jefferson St., Chicago, Ill. "Binks."

TURNER Brass Works, Sycamore, Ill.

WIXON—See Imperial Brass Mfg. Co.

WONDER—See Noera Mfg. Co.

WRAY Pump & Register Co., 191-93 Mill St., Rochester, N. Y. "Kellogg, Jr."

OIL PUMPS

(See Lubricators)

STEAM AIR PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich.

UNION Steam Pump Co., Battle Creek, Mich.

STEAM BOILER FEED PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich.

OFELDT & Sons, August, 123 Liberty St., New York.

UNION Steam Pump Co., Battle Creek, Mich.

WATER CIRCULATING PUMPS

AUTO & Power Appliance Co., The Arcade, Cleveland, O.

BLACKMER Rotary Pump, Power & Mfg. Co., Petoskey, Mich.

BRENNAN Motor Co., Syracuse, N. Y.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

BYRNE, Kingston & Co., Kokomo, Ind. (See page 71.)

CIRCULATION Pump Co., 1693 Broadway, New York, N. Y. "Gunther."

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GUNTHER—See Circulation Pump Co.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

LIPMAN Mfg. Co., 210 Pleasant St., Beloit, Wis.

LOBEE Pump & Machinery Co., 133-41 Terrace, Buffalo, N. Y.

McCORD & Co., Detroit, Mich. (See page 423.)

MILWAUKEE Motor Co., 32d & Burleigh Sts., Milwaukee, Wis.

NATIONAL Cycle Mfg. Co., Bay City, Mich.

NEW YORK Gear Works, 56 Greenpoint Ave., Brooklyn, N. Y. (See page 129.)

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y. (See page 41.)

SANDERS, Chas., 182 DeKalb Ave., Brooklyn, N. Y.

POWER PUMPS AND AIR COMPRESSORS

(For garage use)

BROWN Beer Pump Co., E. R., 11 Chardon St., Boston, Mass.

BRUCE-MERRIAM-ABBOTT Co., Columbus Rd., Cleveland, O.

CHICAGO Pneumatic Tool Co., 1010 Fisher Bldg., Chicago, Ill.

CHRISTENSEN Engineering Co., 841-47 30th St., Milwaukee, Wis.

CROWELL, J. Gilmer, 298 Taafe Pl., Brooklyn, N. Y.

FULMER, C. F., 415 Sycamore St., Plainfield, N. J.

Complete Index to Classification appears on Pages 7 to 18.

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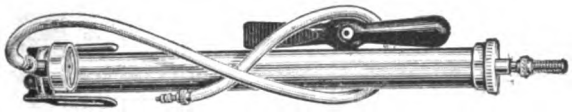
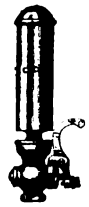



Do You Know Our Goods?

If Not—You should send for our new 1909 Catalogue No. 50 and become acquainted.

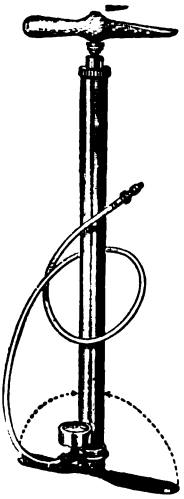
WE ARE THE LARGEST AND OLDEST EXCLUSIVE MANUFACTURERS OF AIR PUMPS IN THE WORLD

Our Gleason "Quick Service" Lever Pump, Cordeaux and Michelin French Pumps, manufactured in our Brooklyn factory, are the best selling automobile pumps in PARIS, where the competition in high grade specialties is keenest.

THEY SHOULD BE GOOD ENOUGH FOR YOU

We manufacture a complete line of Air Compressors for Garages, Motor Boats, Etc., Air Pumps, Air Whistles, Grease and Oil Guns, Oil Pumps and Air Appliances.

"If it's compressed air we make it!"

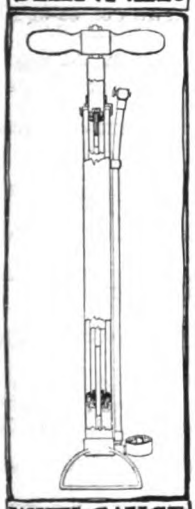


GLEASON-PETERS AIR PUMP CO.

Main Office and Plant: 255-261 Classon Ave., BROOKLYN, N. Y.

SKINNER

SKINNER



WITH GAUGE

Compound PUMPS

Single Acting Pumps
Engine-driven Pumps
Auto Trucks
Pressure Registers
Pump Nipples
Pump Hose

At All Dealers.

SKINNER & SKINNER,
Manufacturers
CHICAGO, ILL.
Eastern Representatives
JARMAN & BAKER,
1779 Broadway, New York, N.Y.

The "Stapley"

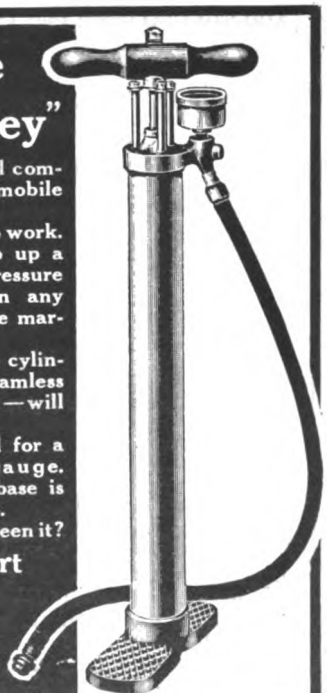
is a powerful compound automobile tire pump.

It is easy to work. It will pump up a tire to any pressure quicker than any pump on the market.

The pump cylinder is a seamless brass tube—will not rust.

It is fitted for a pressure gauge. The pump base is non-leakable.

Have you seen it?



Bridgeport Brass Co.,
253 Broadway
New York

Mills: Bridgeport, Conn.

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PUMPS (Continued)

POWER PUMPS AND AIR COMPRESSORS (Continued)

JACOBSON Machine Mfg. Co., Warren, Pa.

MARTIN & Anson Co., 2226 Indiana Ave., Chicago, Ill.

NATIONAL Brake & Electric Co., Larkin St. & Belleview Pl., Milwaukee, Wis.

NEW Era Gas Engine Co., 9 Dale Ave., Dayton, O.

OSWALD Co., C. J., 53-55 N. Market St., Grand Rapids, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page opposite.)

VICTOR Electric Co., 55-61 Market St., Chicago, Ill.

WESTINGHOUSE Air Brake Co., Pittsburg, Pa.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

FULLER & Co., Hallowell, Me.

HOFFMAN Co., J. W., 8 Medford St., Boston, Mass.

LUCAS & Co., John, Race & Fourth Sts., Philadelphia, Pa.

ORDAMOR—See Baker, Wm. T.

PHILLIPS Paint & Color Co., Rahway, N. J.

PIQUA Paint & Putty Co., Piqua, O.

WILHELM Co., A., Reading, Pa.

PURIFIERS

ACETYLENE GAS PURIFIERS

EDMUNDS & Jones Mfg. Co., 317 Riopelle St., Detroit, Mich.
(See page 157.)

ENGLISH & Mersick Co., New Haven, Conn

PETERSON Mfg. Co., O. W., 1256 Michigan Ave., Chicago, Ill.
(See page 471.)

ARC-TOLEDO Spark Plug Co., 114 Michigan

PUSHES

FOOT PUSHES

(For ringing electric bells)

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y.

PUTTY

ACME White Lead & Color Works, Detroit, Mich.

ALLENTOWN Mfg. Co., 26 S. Sixth St., Allentown, Pa.

AMERICAN Whiting & Putty Mfg. Co., 200 Water St., New York, N. Y.

BAKER, Wm. T., 228-32 Suydam Ave., Jersey City, N. J. "Ordamor."

BELKNAP, McSherry & Moran Co., E. S., 5 Ainslie St., Brooklyn, N. Y.

BRIGGS & Co., John, 14 Washington St., Boston, Mass.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

DEVOE & C. T. Raynolds Co., F. W., 103 Fulton St., New York, N. Y.

DICKS & Wiggim Co., 28 N. Canal St., Dayton, O.

RACES

BALL RACES

(See Cups, Ball)

RACKS

HAT RACKS

BRIDGEPORT Coach Lace Co., 805 Wood Ave., Bridgeport, Conn.

HORSTMAN Co., Wm. H., 5th & Cherry Sts., Philadelphia, Pa.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

VOGHT Mfg. & Coach Lace Co., 324-34 St. Paul St., Rochester, N. Y.

TRUNK RACKS

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.
(See page 221.)

AUTO Blacksmith Shop, 1335 Michigan Ave., Chicago, Ill.

CONNECTICUT Steel & Wire Co., 55-61 Allyn St., Hartford, Conn. "Standard."

CRADLE—See Motor Car Supply Co.

DUANE & Co., W. J., 1771 Broadway, New York, N. Y.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill.
(See page 451.)

FULLER Co., G. W., 182-84 Asylum St., Hartford, Conn.

MASON, John A., 312 Washington St., Newton, Mass.

MOTOR Car Supply Co., 1425-27 Michigan Ave., Chicago, Ill. "Cradle."
(See page 465.)

NOONAN Tool & Machine Works, 105 E. Dow St., Rome, N. Y.

P & S—See Smith, Charles A.

SMITH, Charles A., Church Lane & P. & R. Ry., Germantown, Philadelphia, Pa. "P & S."

SMITH Machine Co., H., 51 Godwin St., Paterson, N. J.

STANDARD—See Connecticut Steel & Wire Co.

STANDARD Auto Specialty Co., 56 Boerum St., Brooklyn, N. Y.

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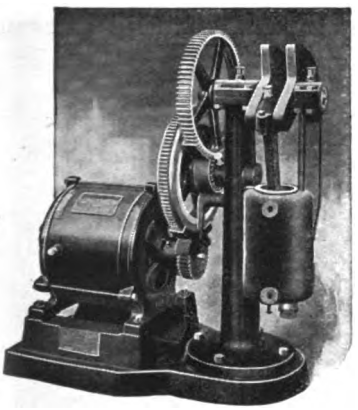
AIR COMPRESSORS



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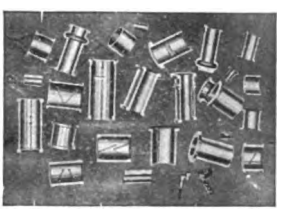

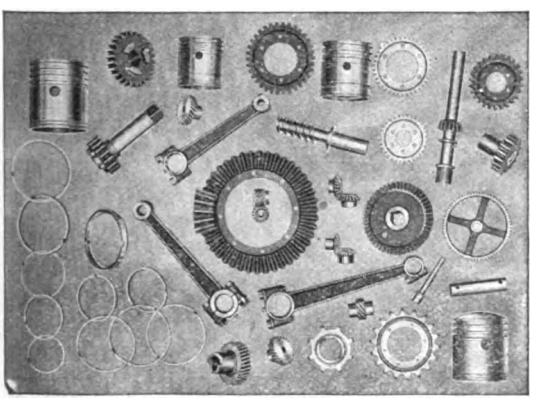

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RADIATORS

WATER COOLERS OR RADIATORS

A. H. & S. Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

A-Z Co., 530 W. 56th St., New York, N. Y. (See page opposite.)

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill. (See page 109.)

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 109.)

BUSH Mfg. Co., 79 Commerce St., Hartford, Conn. (See page 197.)

DETROIT Auto Specialty Co., 910 Greenwood Ave., Detroit, Mich.

FEDDERS Mfg. Works, Buffalo, N. Y. (See page 485.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See page 455.)

HEWITT Motor Co., 6-10 E. 31st St., New York, N. Y. "Livingston."

KELLS Mfg. Co., W. J., 62-66 Van Winkle Ave., Jersey City, N. J. (See page 147.)

KINSEY Mfg. Co., Dayton, O. "Kinwood." (See page 143.)

KINWOOD—See Kinsey Mfg. Co.

LIVINGSTON—See Hewitt Motor Co.

LONG Mfg. Co., 1430-34 Michigan Ave., Chicago, Ill. (See page 147.)

McCORD & Co., Detroit, Mich. (See page 423.)

MAYO Radiator Co., New Haven, Conn. (See page 145.)

METAL Stamping Co., 243 West St., New York, N. Y.

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y. (See page 147.)

ROME-TURNEY Radiator Co., Rome, N. Y. (See page 99.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WRIGHT Cooler & Hood Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

RAILS

ROBE OR COAT RAILS

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill. (See page 221.)

ALLEN Fire Department Supply Co., Providence, R. I.

APPLIANCE Mfg. Co., 60 W. Van Buren St., Chicago, Ill.

AUTO Accessories Mfg. Co., Detroit, Mich. "Sterling." (See page 237.)

AUTO Rail & Equipment Co., 113 Michigan Trust Bldg., Grand Rapids, Mich.

COWLES & Co., C., New Haven, Conn. (See page 143.)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich. (See page 63.)

ENGLISH & Mersick Co., New Haven, Conn.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

GARAGE Equipment Co., Milwaukee, Wis. "Ideal."

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HILLMAN Plating & Auto Supply Co., 446 Tremont St., Boston, Mass.

IDEAL—See Garage Equipment Co.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

MASON, John A., 312 Washington St., Newton, Mass.

METALLIC Specialties Co., 322 N. Broad St., Philadelphia, Pa.

MURDOCK Co., Jas., Jr., 116 Opera Place, Cincinnati, O.

NEW YORK Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y.

NONPAREIL Brass Co., 143 Summer St., Providence, R. I. (See page 391.)

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RILEY Bros., Bridgeton, N. J.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STERLING—See Auto Accessories Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

RECORDERS

VEHICLE MOVEMENT RECORDER

(For recording time vehicle is used)

ACME Tire Chain Co., 514 Pearl St., New York, N. Y. "Timograph."

AUTOMOBILE Protection Co., 322 Hudson St., New York, N. Y. "Watch Dog."

JONES, Wm. S., Drexel Bldg., Philadelphia, Pa. "Phelps."

PHELPS—See Jones, Wm. S.

RECOMETRE Co. of Am., Broadway & 74th St., New York, N. Y.

TIMOGRAPH—See Acme Tire Chain Co.

WATCH DOG—See Automobile Protection Co.

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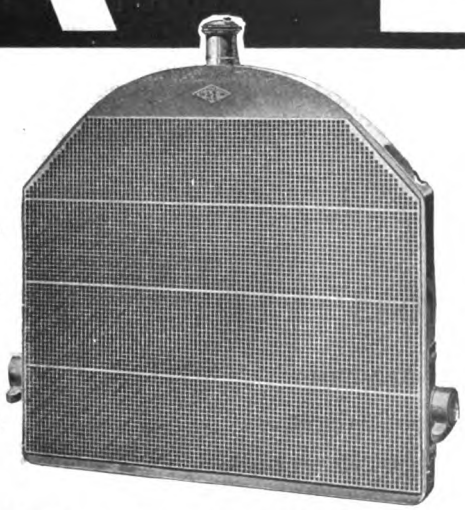

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AUTO & Supply Mfg. Co., 2374 Woodhill Rd., Cleveland, O.

COOPER Hewitt Electric Co., New York, N. Y.

D. D. Rectifier Co., 3932 Olive St., St. Louis, Mo.

ELECTRICAL & Mechanical Development Co., Asbury Park, N. J. "Hickley."

GENERAL Electric Co., Schenectady, N. Y.

HICKLEY—See Electrical & Mechanical Development Co.

SIRCH Electrical & Testing Laboratories, Los Angeles, Cal.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

REFLECTORS

MIRROR LAMP REFLECTORS

BAUSCH & Lomb Optical Co., Rochester, N. Y.

FRY Glass Co., H. C., Rochester, Pa.

MACBETH-EVANS Glass Co., Wabash Terminal Bldg., Pittsburg, Pa.

SCHEIDIG & Co., John, 50 Maiden Lane, New York, N. Y.

STEVENS & Co., 472 Potter Ave., Providence, R. I. "Thermo."

THERMO—See Stevens & Co.

REGULATORS

FUEL FEED REGULATORS

OFELDT & Sons, F. W., Nyack-on-the-Hudson, N. Y.

WALKER Mfg. Co., E. C., 811 Nelson St., Louisville, Ky.

TANK PRESSURE REGULATORS

(For regulating the exhaust pressure on gasoline or oil tanks)

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill.
(See page 63.)

LOCKE Regulator Co., 76 North St., Salem, Mass.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

WATER LEVEL REGULATORS

LANE Motor Vehicle Co., Poughkeepsie, N. Y.

OFELDT & Sons, P. W., Nyack-on-the Hudson, N. Y.

WALKER Mfg. Co., E. C., 811 Nelson St., Louisville, Ky.

REPAIRERS

SPRING REPAIRERS

(See Clamps, Spring Repair)

RESTS

BOW RESTS

CRANDALL-STONE Co., Binghamton, N. Y.

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

EVER-TIGHT—See Garage Equipment Co.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill.
(See page 451.)

GARAGE Equipment Co., Milwaukee, Wis. "Ever-Tight."

GLOBE Brass Works, 15-17 Macomb St., Detroit, Mich.

HICKERSON Mfg. Co., 6106-30 La Salle St. Chicago, Ill.

METAL Stamping Co., 243-53 West St., New York, N. Y.

MORAN, Stephen J., Cambridge, Mass.

NON-CORROSIVE Metal Co., Watertown, Mass.
(See page 233.)

SMITH & Co., Jos N., 154-62 Fourth St., Detroit, Mich.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.
(See page 141.)

FOOT RESTS

(See also Hassocks)

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 219.)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.
(See page opposite.)

ALLEN Fire Department Supply Co., Providence, R. I.

APPLIANCE Mfg. Co., 60 W. Van Buren St., Chicago, Ill.

AUTO Accessories Mfg. Co., Detroit, Mich. "Sterling."
(See page 237.)

AUTO Rail & Equipment Co., 118 Michigan Trust Bldg., Grand Rapids, Mich.

BURROWES Co., E. T., Portland, Me. "Royal."
(See page 277.)

COWLES & Co., C., New Haven, Conn.
(See page 143.)

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Guaranteed absolutely accurate. Is the only speed indicator made on the Magnetic Induction principle. Because of the principle it accurately indicates every range of speed from zero to 100 miles per hour.

All other instruments are made on the centrifugal principle. They fail to indicate any speed whatever under 5 to 10 miles per hour.

The Auto-Meter is so durably made that practical tests have shown that it will endure a MILLION MILES of riding without perceptible wear, or departing from absolute accuracy more than 10 feet to the mile. In the Glidden Tour centrifugal instruments lost up to 34% in accuracy during the trip.

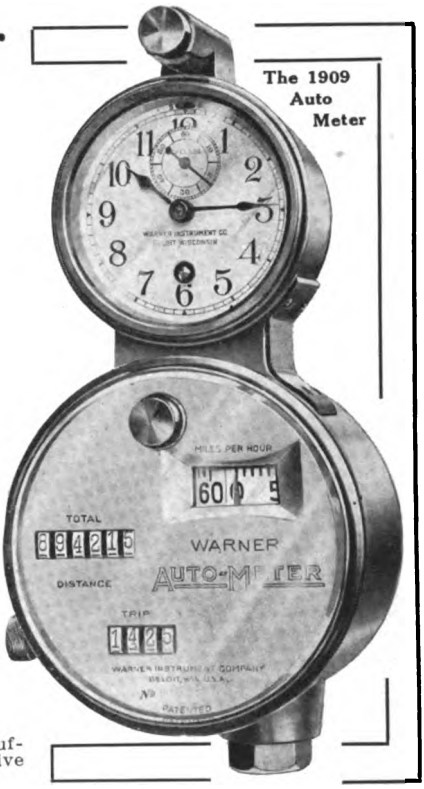
We invite comparative tests. Before you decide on any Speed Indicator put the Auto Meter on one side of your dash and any other indicator at any price on the other. Then use your watch over a measured course. Keep the instrument which **tells the truth.** We know which it will be.

The Warner Instrument Company

Factory and Main Office

341 Wheeler Ave., Beloit, Wis.

Philadelphia, cor. Broad and Race; San Francisco, 550 Golden Gate Ave.; Indianapolis, 330½ N. Illinois St.; Cleveland, 2062 Euclid Ave.; Pittsburg, 3234 Forbes St.; Boston, 925 Boylston St.; Los Angeles, 1212 S. Main St.; New York, 1902 Broadway; Chicago, 1305 Michigan Ave.; Buffalo, 722 Main St.; St. Louis, 3923 Olive St.; Detroit, 239 Jefferson Ave.



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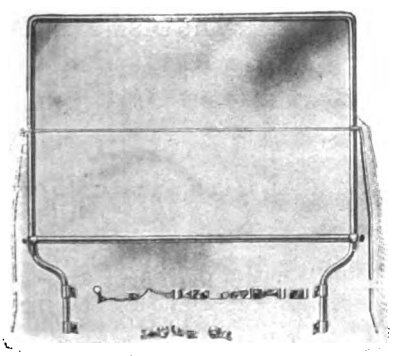

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RESTS (Continued)

FOOT RESTS (Continued)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich. (See page 63.)

GARAGE Equipment Co., Milwaukee, Wis. "Ideal."

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HARRIS, Chas. J., 457 Mill Hill Ave., Bridgeport, Conn.

HILLMAN Plating & Auto Supply Co., 446 Tremont St., Boston, Mass.

IDEAL—See Garage Equipment Co.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

METALLIC Specialties Co., 322 N. Broad St., Philadelphia, Pa.

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y.

NONPAREIL Brass Co., 143 Summer St., Providence, R. I. (See page 391.)

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RILEY Bros., Bridgeton, N. J.

ROYAL—See Burrows Co.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

STERLING—See Auto Accessories Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

RETAINERS

BALL RETAINERS

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CROSBY Co., Buffalo, N. Y. (See page 249.)

GLOBE Machine & Stamping Co., Cleveland, O. (See page 407.)

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio. (See page 499.)

STAR Ball Retainer Co., Lancaster, Pa. (See page 445.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

RHEOSTATS

BATTERY CHARGING RHEOSTATS

CUTLER-HAMMER Mfg. Co., 12th & St. Paul Sts., Milwaukee, Wis.

GENERAL Electric Co., Schenectady, N. Y.

LEONARD Electric Co., Ward, Bronxville, N. Y.

NATIONAL Rheostat Co., 115 Franklin St., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

WIRT Electric Co., 3108 Germantown Ave., Philadelphia, Pa.

RIMS

QUICK DETACHABLE RIMS

DIAMOND Rubber Co., Akron, O. "Marsh."

FISK Rubber Co., Chicopee Falls, Mass. (See page 197.)

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O. (See page 199.)

HARTFORD Rubber Works Co., Hartford, Conn. "Midgley."

MARSH—See Diamond Rubber Co.

MIDGLEY—See Hartford Rubber Works Co.

NEWMASTIC Tire Co., 68th St. & Broadway, New York, N. Y. "Parker."

PARKER—See Newmastic Tire Co.

REPUBLIC Rubber Co., Youngstown, O. (See page 269.)

TRIDENT Tire Co., 1593 Broadway, New York, N. Y.

REMOVABLE OR DISMOUNTABLE RIMS

AMERICAN Auto Rim Co., 132 Nassau St., New York, N. Y.

AUTO Improvement Co., 316 Hudson St., New York, N. Y.

CONTINENTAL Caoutchouc Co., 43 Warren St., New York N. Y. (Importers).

CRESCENT Parts Co., 244 W. 49th St., New York, N. Y.

DIAMOND Rubber Co., Akron, O.

FIRESTONE Tire & Rubber Co., Miller St. & Sweitzer Ave., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass. (See page 197.)

HARTFORD Suspension Co., 139 Bay St., Jersey City, N. J. (See page 243.)

HEALY Leather Tire Co., 90 Gold St., New York, N. Y. (See page 441.)

MICHELIN Tire Co., Milltown, N. J. (See page opposite.)

NADALL Mfg. Co., 1223 Michigan Ave., Chicago, Ill.

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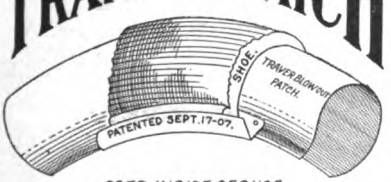

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SAN FRANCISCO, 308 Van Ness Avenue
DENVER, 15 East Colfax Avenue

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RIMS (Continued)

REMOVABLE OR DISMOUNTABLE RIMS (Continued)

PRESTO Detachable Rim Co., Jersey City, N. J.

SAGER Co., J. H., 365 South Ave., Rochester, N. Y.

TRIDENT Tire Co., 1593 Broadway, New York, N. Y.

STANDARD RIMS

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn. (See page 225.)

JAMESVILLE Mfg. Co., Jamesville, N. Y.

MOTT Wheel Works, Pleasant St., Utica, N. Y.

PEUGEOT Freres, 296 Broadway, New York, N. Y. (Importers.)

STANDARD Welding Co., Cleveland, O. (See page 263.)

WESTON-MOTT Co., Flint, Mich. (See page 151.)

RUBBER STEERING-WHEEL RIMS

DIAMOND Rubber Co., Akron, O.

STOKES Rubber Co., Jos., Trenton, N. J.

WOOD STEERING-WHEEL RIMS

ACME Veneer Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page 53.)

AMERICAN Wood Rim Co., Onaway, Mich.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

TUCKER Wood Work Co., Sidney, O.

WOOD RIMS OR FELLOES

AMERICAN Wood Rim Co., Onaway, Mich.

HAGERSTOWN Spoke & Bending Co., Walnut & Church Sts., Hagerstown, Md.

JONES & Co., Phineas, Newark, N. J. (See page 447.)

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

TUCKER Woodwork Co., Sidney, O.

RINGS

DUST RINGS

(See Washers, Felt)

PISTON RINGS

DEMOREST Mfg. Co., Williamsport, Pa.

JORDEN, R. H., 1102 Evergreen Ave., Pittsburg, Pa.

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio. (See page 499.)

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 217.)

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O. (See page 189.)

VERSTRAETE-FYFE Mfg. Co., Burlington, Wis. (See page 59.)

RIVETS

BRASS AND COPPER RIVETS

BLAKE & Johnson Co., 125 E. Main St., Waterbury, Conn.

BRIDGEPORT Brass Co., 253 Broadway, New York, N. Y. (See page 215.)

COBB & Drew, Plymouth, Mass.

FALLS Rivet & Machine Co., Cuyahoga Falls, O.

HASSALL, John, 183 Lafayette St., New York, N. Y. (See page 143.)

HUNGERFORD Brass & Copper Co., U. T., 497-503 Pearl St., New York, N. Y. "Star."

PLUME & Atwood Mfg. Co., Waterbury, Conn.

PROGRESSIVE Mfg. Co., 41 Norwood St., Torrington, Conn.

ROME Brass & Copper Co., Rome, N. Y.

STAR—See Hungerford Brass & Copper Co.

TAUNTON Rivet Co., Taunton, Mass.

WATERBURY Brass Goods Corp., Washington Ave., Waterbury, Conn.

WATERBURY Mfg. Co., Waterbury, Conn.

COPPER RIVETS

(See Rivets, Brass)

IRON AND STEEL RIVETS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

ATLAS Bolt & Screw Co., 1289 Marquette Road, N. E., Cleveland, O.

CHAMPION Rivet Co., Rice Ave. & Erie R. R., Cleveland, O. "Victor."

COBB & Drew, Plymouth, Mass.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet & Machine Co., Cuyahoga Falls, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAND Crossing Tack Co., Grand Crossing, Chicago, Ill.

HASSALL, John, 183 Lafayette St., New York, N. Y. (See page 143.)

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BRIDGEPORT, CONN.

MANUFACTURERS OF

"SWEDOH"

BRIGHT, COLD ROLLED, STRIP STEEL

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which bear the official stamp of the tire makers and will fit all standard detachable tires.

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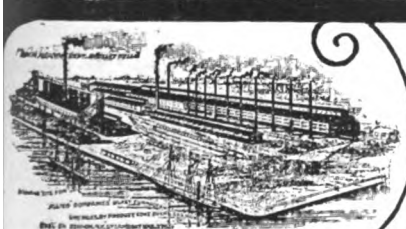
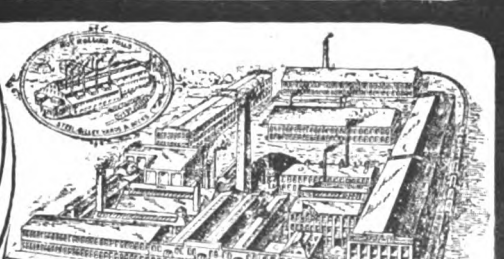


These miniature sketches give you an idea of the capacity of our THREE plants. We can take care of all orders promptly. TRY US.



Cold Rolling Mills, Manuf'g Dept's, Factories & Main Offices. Business Est. 1877, Inc. 1844

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RIVETS (Continued)

IRON AND STEEL RIVETS (Continued)

HOOPES & Townsend Co., 1330 Buttonwood St., Philadelphia, Pa.

KANSAS City Bolt & Nut Co., Kansas City, Mo.

LAMSON & Sessions Co., 2188 Scranton Road, Cleveland, O.

MICHIGAN Bolt & Nut Works, foot Meldrum Ave., Detroit, Mich.

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

NEWARK Rivet Works, 146 Monroe St., Newark, N. J.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PITTSBURG Rivet Co., 38th St. & Junction Ry., Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

TAUNTON Rivet Co., Taunton, Mass.

VICTOR—See Champion Rivet Co.

NON-SKID TIRE RIVETS

DIEN, Ch., 43-45 W. 34th St., New York, N. Y. (Importer.)

PLATINUM RIVETS

(See Platinum)

ROBES

AUTOMOBILE LAP ROBES

AMERICAN Buffalo Robe Co., Buffalo, N. Y.

AUTO Robe & Rubber Co., 41 Wooster St., New York, N. Y. "Peerless."

BEEBE-ELLIOTT Co., 608 Wisconsin St., Racine, Wis. "Cling-Tight." (See page opposite.)

BISHOP & Co., J. H., Wyandotte, Mich.

BLIZZARD—See Vehicle Apron & Hood Co.

BURLINGTON Blanket Co., Burlington, Wis. "Sho-Fur." (See page opposite.)

CHASE Co., L. C., Boston, Mass. (See page 65.)

CHICAGO Auto Robe Supply Co., 155-159 Market St., Chicago, Ill.

CLING-TIGHT—See Beebe-Elliott Co.

CROSBY Frisian Fur Co., 116 Mill St., Rochester, N. Y.

DAVIS Robe Co., 126 State St., Chicago, Ill.

DRAPER Bros., Canton, Mass.

GAUSLER & Starr Co., 249 Market St., Philadelphia, Pa.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

LAPLANDER—See Mishawaka Textile Co.

MISHAWAKA Textile Co., Mishawaka, Ind. "Laplander."

NATIONAL Casket Co., 264 Wabash Ave., Chicago, Ill.

PEERLESS—See Auto Robe & Rubber Co.

PIONEER Woolen Mills, 1020-40 Beaufait St., Detroit, Mich.

RILEY & Son, Wm. B., Chestnut St., Philadelphia, Pa.

SCANDINAVIAN Fur & Leather Co., 16 W. 33rd St., N. Y. City.

SHO-FUR—See Burlington Blanket Co.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt.

STALL & Dean Mfg. Co., 23 Foundry St., Brockton, Mass.

VEHICLE Apron & Hood Co., Columbus, O. "Blizzard." (See page 135.)

WALLACE Co., Hugh, Boulevard & Orleans St., Detroit, Mich.

RODS

ALUMINUM RODS

(See Aluminum, Sheet)

BRASS RODS

(See Brass, Sheet)

CONNECTING RODS

(Finished or Machined Rods. For Connecting Rod in the rough—See Forgings, Drop.)

AMERICAN & British Mfg. Co., Bridgeport, Conn.

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich. (See page 307.)

FUNK Engineering Co., 39-45 14th St., Hoboken, N. J.

GILL & Sons Forge & Machine Works, P. H., 1 Lorraine St., Brooklyn, N. Y. (See page 319.)

McCUE Co., Hartford, Conn. (See page 93.)

MUSKEGON Motor Specialties Co., Muskegon, Mich. (See page 69.)

NEW PROCESS Steel Co., 219 W. River St., Marshall, Mich. (See page 253.)

OBENBERGER Co., John, 220 Lake St., Milwaukee, Wis.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 217.)

STANDARD Connecting Rod Co., Beaver Falls, Pa. (See page 117.)

TINDEL-MORRIS Co., Eddystone, Pa.

COPPER RODS

(See Brass, Sheet)

Complete Index to Classification appears on Pages 7 to 18.

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"Patented"

Get Busy and write to-day for prices and particulars.

A robe that every automobile owner will buy and not be without.

Price reasonable, allowing good profit for dealers. why not make some extra dollars.

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RODS (Continued)

FIBRE RODS

(See Fibre, Hard)

RUBBER RODS

(See Rubber, Hard)

STEEL RODS

(See Steel)

ROPE

BRONZE WIRE ROPE OR CABLE

ELEPHANT—See Phosphor Bronze Smelting Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant." (See page 453.)

REEVES & Son, Paul S., 1415 Catharine St., Philadelphia, Pa.

RIVERSIDE Metal Co., Riverside, N. J.

STEEL WIRE ROPE OR CABLE

AMERICAN Steel & Wire Co., The Rookery, Chicago, Ill.

BRODERICK & Bascom Rope Co., 809 N. Main St., St. Louis, Mo.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

LESCHEN & Sons' Rope Co., A., 920 N. First St., St. Louis, Mo.

MACOMBER-WHYTE-MOON Co., 122 Centre St., New York, N. Y.

MACOMBER & Whyte Rope Co., 266-68 S. Clinton St., Chicago, Ill.

ROEBLINGS & Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

WASHBURN Wire Co., Phillipsdale, R. I.

WATERBURY Co., 69 South St., New York, N. Y.

WILLIAMSPORT Wire Rope Co., Williamsport, Pa.

RUBBER

HARD RUBBER

(Sheet, Rod and Tube)

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

DIAMOND Rubber Co., Akron, O.

DICKINSON Hard Rubber Co., Springfield, Mass.

MORGAN & Wright, Detroit, Mich. (See page 271.)

SIEMON Hard Rubber Corp., Burr Road & State St., Bridgeport, Conn.

SPINNEY-WISE & Co., Lynn, Mass.

STOKES Rubber Co., Jos., Trenton, N. J.

VULCANIZED Rubber Co., 488 Broadway, New York, N. Y.

WILKIE Rubber Mfg. Co., Saugus, Mass.

SALTS

SOLDERING SALTS

(See Flux, Soldering)

SCRAPERS

CARBON SCRAPERS

MOUND Tool & Scraper Co., 708 Howard St., St. Louis, Mo. (See page 355.)

SCREENS

HORN SCREENS

AUTOMOBILE Supply Mfg. Co., 139 Emerson Pl., Brooklyn, N. Y.

LOMBARDI Motor Co., Derby, Conn.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. (See page 157.)

TRIPARI Bros. & V. De Prisco Co., 372-74 Broome St., New York, N. Y.

SCREW-EYES

BRASS AND IRON SCREW-EYES

BROOKS & Sons, M. S., Chester, Conn.

HUMASON & Beckley Mfg. Co., New Britain, Conn.

JENCKES Mfg. Co., Pawtucket, R. I.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WILCOX, Chittenden & Co., 83 Main St. Middletown, Conn.

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

Complete Index to Classification appears on Pages 7 to 18.

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Axles and Springs

Higher in Price—BUT Higher in Quality

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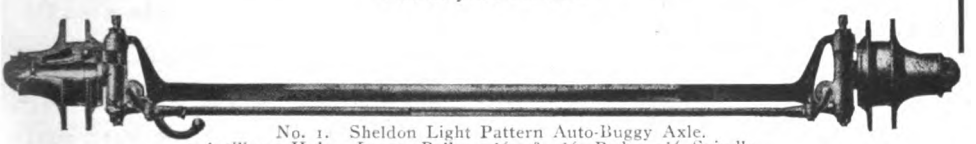
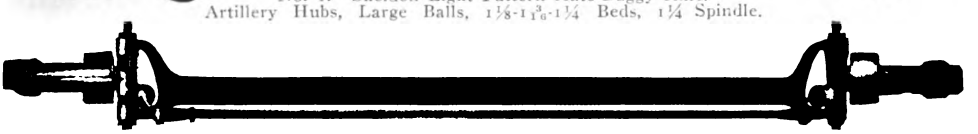
There is nothing that helps "Automobile" sales like an easy riding car.

The easy riding quality and durability of "Sheldon" springs are well known among largest manufacturers.

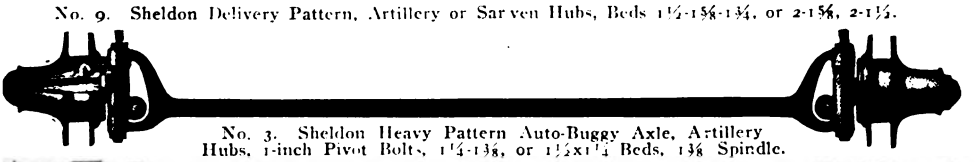
We employ a corps of mechanical experts, who are at your service.



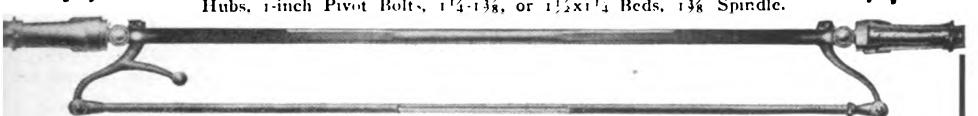
No. 1. Sheldon Light Pattern Auto-Buggy Axle. Artillery Hubs, Large Balls, 1⅛-1 3/16-1¼ Beds, 1¼ Spindle.



No. 9. Sheldon Delivery Pattern, Artillery or Sarven Hubs, Beds 1½-1⅝-1¾, or 2-1⅝, 2-1½.



No. 3. Sheldon Heavy Pattern Auto-Buggy Axle, Artillery Hubs, 1-inch Pivot Bolts, 1¼-1⅜, or 1½x1¼ Beds, 1⅜ Spindle.



No. 8. Sheldon Light Pattern, with Richards Long Distance Spindle.

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The styles shown above are only a few standard patterns. Highest grade only. No pressed steel parts or cheap construction. Extra large size "BALLS" used on all bearings. Simple and perfect.

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CORBIN Screw Corporation, New Britain Conn.

CRITCHLEY Machine Screw Co., 100 Beacon St., Worcester, Mass.

DETROIT Screw Works, Detroit, Mich. (See page 483.)

FERRY Cap & Set Screw Co., 2151 Scranton Road, Cleveland, O.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 481.)

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOLT & Co., W. H., 95 Pine St., Providence, R. I.

KIRK-LATTY Mfg. Co., W. Madison Ave. & N. Y. C. Ry., Cleveland, O.

MICHIGAN Screw Co., Lansing, Mich.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page opposite and 349.)

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

NEW HAVEN Machine Screw Co., 195 Saltonstall Ave., New Haven, Conn.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

ST. LOUIS Screw Co., 3017 N. 13th St., St. Louis, Mo.

WESTERN Automatic Machine Screw Co., 214 Foster Ave., Elyria, O.

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

THUMB SCREWS

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

CHICAGO Screw Co., 519 Homan Ave., Chicago, Ill.

CINCINNATI Screw & Tap Co., 2442 Beekman St., Cincinnati, O.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

KEYSTONE Drop Forge Works, Chester, Pa.

PENINSULAR Milled Screw Co., 751 Bellevue Ave., Detroit, Mich.

ROCHESTER Machine Screw Co., Rochester, N. Y.

ST. LOUIS Screw Co., 3017 N. 13th St., St. Louis, Mo.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

WESTERN Automatic Machine Screw Co., 214 Foster Ave., Elyria, O.

WOOD SCREWS

AMERICAN Screw Co., Providence, R. I.

ATLANTIC Screw Co., Charter Oak Ave., Hartford, Conn.

COLUMBIA Screw Co., Chicago, Ill.

CORBIN Screw Corp., New Britain, Conn.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page opposite and 349.)

READING Screw Co., Norristown, Pa.

SCREW MACHINE PARTS

SPECIAL SCREW MACHINE PARTS TO ORDER

ANTHONY Screw Co., 330 Chandler St., Worcester, Mass.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y. (See page 357.)

BARNES Co., Wallace, Bristol, Conn. (See page 421.)

BLAKE & Johnson Co., 125 E. Main St., Waterbury, Conn.

BOWN Machine Co., 129 W. Main St., Battle Creek, Mich.

BRADFORD Motor Works, Bradford, Pa.

CASSADY Fairbanks Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO Screw Co., 519 Homan Ave., Chicago, Ill.

COLUMBUS Screw & Machine Co., 244-46 Kaiser St., Columbus, Ohio.

CRITCHLEY Machine Screw Co., 100 Beacon St., Worcester, Mass.

DETROIT Screw Works, Detroit, Mich. (See page 483.)

DOVER Co., Geo. W., 80 Clifford St., Providence, R. I.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 119.)

ECLIPSE Machine Co., Elmira, N. Y.

ELYRIA Machine Parts Co., Elyria, O.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GEOMETRIC Tool Co., New Haven, Conn.

HAMPDEN Machine Screw Co., Springfield, Mass. (See page 317.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HANSON Bros., Plainville, Conn.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 481.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOLT & Co., W. H., 95 Pine St., Providence, R. I.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

LONG Arm System Co., Cleveland, O. (See page 93.)

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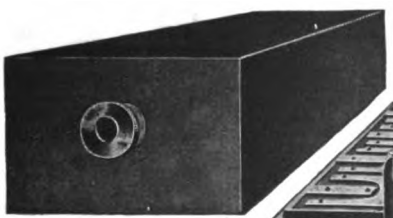

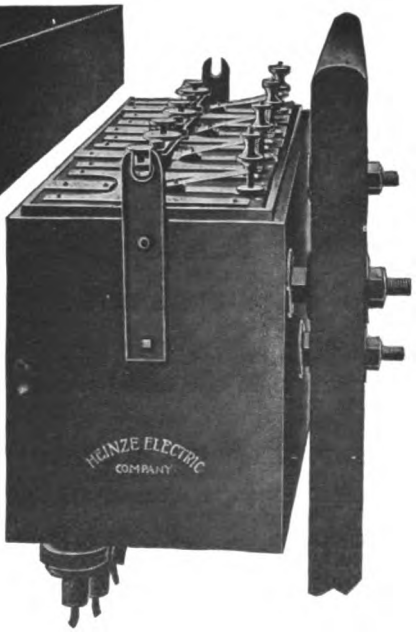

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McCORD & Co., Detroit, Mich. (See page 423.)

MICHIGAN Screw Co., Lansing, Mich.

MOSSBERG Co., Frank, Attleboro, Mass.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See pages 231 and 349.)

NATIONAL Cycle Mfg. Co., Bay City, Mich.

PENINSULAR Milled Screw Co., 751 Bellevue Ave., Detroit, Mich.

PERRY-FAY Mfg. Co., Elyria, Ohio.

SCHWEPPE & Wilt, Congress & Sixth Sts., Detroit, Mich.

SCREW Machine Products Corp., 236 Aborn St., Providence, R. I.

SPARKS - WITHINGTON Co., Jackson, Mich. (See page 499.)

TURNER Brass Works, Sycamore, Ill.

WATERBURY Mfg. Co., Waterbury, Conn.

WESTERN Automatic Machine Screw Co., 214 Foster Ave., Elyria, O.

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

SEARCHLIGHTS

ACETYLENE SEARCHLIGHTS

(See Lamps, Acetylene)

ELECTRIC SEARCHLIGHTS

(See Headlights, Electric)

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ANDERSON & Co., F. W., 729 N. Uber St., Philadelphia, Pa. "20th Century."

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CONNECTICUT Steel & Wire Co., 55-61 Allyn St., Hartford, Conn.

DAYTON Folding Tonneau Co., 620-24 Geyer St., Dayton, O.

EMPIRE Gear & Top Co., 207 N. 22nd St., Philadelphia, Pa.

FRANTZ Body Mfg. Co., Stanton Ave & Getz St., Akron, O. (See page 63.)

FREEMAN Mfg. Co., Geo. B., 1415 Racine St., Racine, Wis.

GRAVES & Congdon Co., Amesbury, Mass. (See page 143.)

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HUME Carriage Co., 66-68 Stanhope St., Boston, Mass.

ITHACA Carriage Co., Ithaca, N. Y.

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill. (See page 59.)

METAL Stamping Co., 243-45 West St., New York, N. Y.

RACINE Metal Chair Co., 406 Main St., Racine, Wis.

20th CENTURY—See Anderson & Co.

SEPARATORS

BOW SEPARATORS

AMESBURY Brass & Foundry Co., Amesbury, Mass.

AUTO Equipment Co., 144 N. Broad St., Philadelphia, Pa. "Paxon."

COWLES & Co., C., New Haven, Conn. (See page 143.)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

EVANS Mfg. Co., 118 West Brookline St., Boston, Mass.

FABER Co., A., Rochester, N. Y. "VZ."

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

JONAH & George, Merrimac, Mass.

LAMAN Auto Top Co., L. L., Utica, N. Y. "Stick Tite." (See page opposite.)

MICHIGAN Top Co., 17 Duffield St., Detroit, Mich. (See page 273.)

MURPHY Co., G. W. J., Merrimac, Mass. (See page opposite.)

NEVER-RUB—See Springfield Auto Top & Upholstering Co.

NON-CORROSIVE Metal Co., Watertown, Mass. (See page opposite.)

PAXON—See Auto Equipment Co.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich.

SPRINGFIELD Auto Top & Upholstering Co., 102-06 Dwight St., Springfield, Mass. "Never-Rub." (See page 275.)

STICK TITE—See Laman Auto Top Co.

VEHICLE Top & Supply Co., 900-06 Cass Ave., St. Louis, Mo. "Vesco." (See page 277.)

VESCO—See Vehicle Top & Supply Co.

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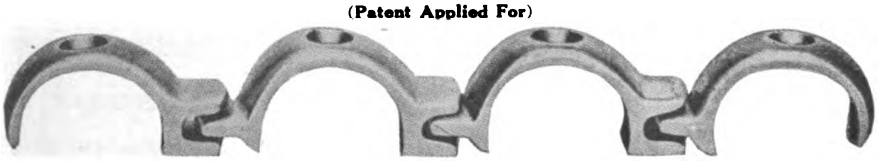
THE MURPHY CURTAIN FASTENER

ABSOLUTELY THE BEST

G. W. J. MURPHY CO., Merrimac, Mass.

TIE "MURRAY" BOW SEPARATOR

(Patent Applied For)



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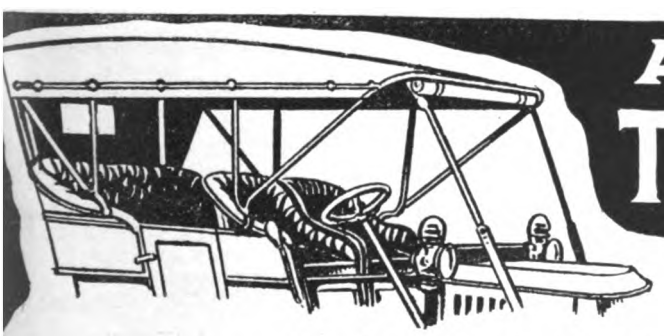

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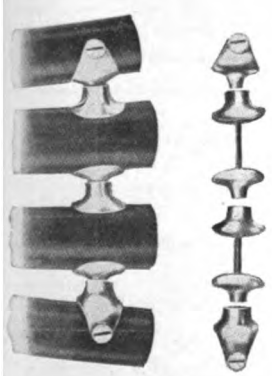

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SEPARATORS (Continued)

BOW SEPARATORS (Continued)

VICTOR Rubber Co., Springfield, O.

VZ—See Faber Co.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. (See page 141.)

GASOLINE SEPARATORS

(See Strainers, Gasoline)

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FLEXIBLE SHAFTING

AUTOMOBILE Supply Mfg. Co., 139 Emerson Pl., Brooklyn, N. Y.

COATES Clipper Mfg. Co., 237 Chandler St., Worcester, Mass.

EMPIRE Battery Co., 123 W. 68th St., New York, N. Y. "Helix." (See pages 53 and 65.)

GEM Mfg. Co., Spruce near 33d St., Pittsburg, Pa.

HAHN, Wm., 220 Washington St., Chicago, Ill.

HELIX—See Empire Battery Co.

NATIONAL Flexible Tube Co., 320 Driggs Ave., Brooklyn, N. Y.

STOW Flexible Shaft Co., 26th & Callowhill Sts., Philadelphia, Pa.

WEBB Mfg. Co., 60 Shipman St., Newark, N. J.

WHITE Dental Mfg. Co., S. S., 12th & Chestnut Sts., Philadelphia, Pa.

SHAFTS

CAM SHAFTS

(See Cam Shafts, Finished)

COUNTER SHAFTS

(See Counter Shafts, Finished)

CRANK SHAFTS

(See Crank Shafts; also Forgings, Drop)

FLEXIBLE SHAFTS

(See Shafting, Flexible)

PROPELLER SHAFTS

HARTFORD Auto Parts Co., Hartford, Conn. (See page 191.)

KINSLER-BENNETT Co., 62 Market St., Hartford, Conn.

LONG Arm System Co., Cleveland, O. (See page 93.)

SPICER Universal Joint Mfg. Co., 75 Madison Ave., Plainfield, N. J. (See page 191.)

SHEIVES

DRIVING SHEIVES

(For High Wheel Buggies)

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

SHELLS

COPPER BOILER SHELLS

HUNGERFORD Brass & Copper Co., U. T., 497-503 Pearl St., New York, N. Y.

RANDOLPH - CLOWES Co., Waterbury, Conn.

STEEL BOILER SHELLS

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

JANNEY, Steinmetz & Co., Fourth & Market Sts., Philadelphia, Pa.

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio. (See page 499.)

PRESSED Steel Tank Co., West Allis, Wis.

STANDARD Welding Co., Cleveland, O. (See page 263.)

SHIELDS

GLASS WIND SHIELDS

ACKERMAN—See Smith & Co.

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill. (See page 221.)

ANGLE—See Russell, H. J.

AUTO Accessories Mfg. Co., Detroit, Mich. "Sterling." (See page 237.)

AUTO Blacksmith Shop, 1335 Michigan Ave., Chicago, Ill.

AUTO Rebuilding Co., 364 Wabash Ave., Chicago, Ill. (See page 353.)

AUTO Wind Shield Co., Brattle Sq., Cambridge, Mass.

AUTOMATIC—See Mezger, C. A.

AUTOMOBILE Specialty Co., 620 Maryland Ave., Pittsburg, Pa. "McGiffin."

BANKER Bros. Co., Baum & Beatty Sts., Pittsburg, Pa. (See page 237.)

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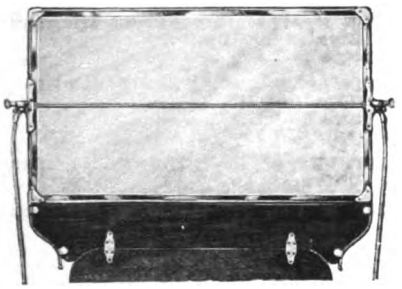

The Troy "New Light Six"

8 New Models For 1909 8

BRASS FRONTS, WOOD FRONTS RUNABOUT FRONTS

All folding. Positively anti-rattle. A size and appropriate pattern for *every* car. A grade for every purse. 1909 Catalog tells all. May we send it *now?*

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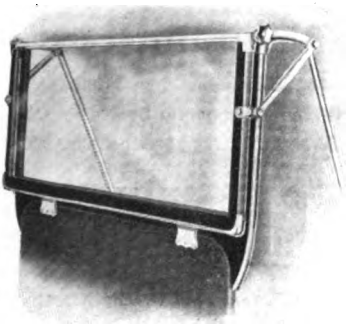
TROY, OHIO



Wheeler MADE GOOD THE SILENT KIND WIND SHIELDS

A Shield of New and Exclusive Features.
Elegance in Design and Finish.
Accessibility and Ease in Operation.
Durability and Simplicity in Construction.
Safe and Silent in Service.
Folds Down Inside of Dash.

DETROIT AUTO SHIELD CO.
1298-1304 Woodward Avenue, Detroit, Mich.

A WIND SHIELD
THAT
WILL NOT RATTLE

PLATE GLASS
MAHOGANY FRAME

Price will interest you

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WORCESTER, MASS.

The Original "Knight" Autoshields

One of the Six models, folded, new style circular cut-out. A very popular model.

Six Folding Models, One Drop Model. None Better Made.
Fully Guaranteed.
Ask Any Dealer or Owner.
Folders and Prices on Request.
Beware of Imitators.

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CHICAGO, ILL.

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SHIELDS (Continued)

GLASS WIND SHIELDS (Continued)

BARNDT-JOHNSTON Auto Supply Co., 408-26 Donaldson St., Columbus, O. (See page 57.)

BEECHER—See Limousine-Carriage Mfg. Co.

BERTRAM & Lamoreaux, 66 Fort St., E. Detroit, Mich.

BLASIER Mfg. Co., M. E. 63 Columbia St., Utica, N. Y.

BREFZE—See Cartier, Chapman & Co.

BRIDGEPORT Vehicle Co., South Ave. & Water St., Bridgeport, Conn.

BROC Carriage & Wagon Co., E. 40th St. & Payne Ave., Cleveland, O.

BUFFALO Auto Body & Trimming Co., 341 Ellicott St., Buffalo, N. Y.

BUOB & Scheu, 1408-10 Gilbert Ave., Cincinnati, O. (See page 275.)

BURROWES Co., E. T., Portland, Me. (See page 277.)

CARTIER, Chapman & Co., Ludington, Mich. "Breeze."

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill. (See page opposite.)

CHICAGO Wind Shield Co., 235 Johnson St., Chicago, Ill. (See page 457.)

COLEMAN, J. C., 58-60 First St., Detroit, Mich.

COLLINS & SON, G. A., Main & Church Sts., Akron, O.

DETROIT Auto Shield Co., 1298-1304 Woodward Ave., Detroit, Mich. "Wheeler." (See page 235.)

DUANE & Co., W. J., 1771 Broadway, N. Y. City.

EMPIRE Gear & Top Co., 207 N. 22d St., Philadelphia, Pa.

FAVORITE—See Smith & Co., Jos. N.

FELLWOCK Automobile & Mfg. Co., 320 Upper Fourth St., Evansville, Ind. "Perfect."

FICKLING & Co., 154 E. 57th St., New York N. Y.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. (See page 507.)

FORD Auto Equipment Co., 1424-26 Michigan Ave., Chicago, Ill.

FRAZIER & Co., W. S., Aurora, Ill.

GUERIN Mfg. Co., Hahn Bldg., Mansfield, O.

HAAS & Kurk, 1655 Ogden Ave., Chicago, Ill.

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HILLMAN Plating & Auto Supply Co., 446 Tremont St., Boston, Mass.

HOLCKER-ELBERG Carriage & Rubber Co., 1420 McGee St., Kansas City, Mo.

HOLCOMB Co., 105 Goffe St., New Haven, Conn. "New Haven."

IDEAL Wind Shield Co., 1845-47 Broadway, New York, N. Y.

IRVIN Mfg. Co., Tenth & Canal Sts., Indianapolis, Ind.

JACOBSON Bros., Bergen St. & 14th Ave., Newark, N. J.

JOHNSON Service Co., 149-53 Michigan St., Milwaukee, Wis. (See page 257.)

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill. (See page 59.) (See page 457.)

KNIGHT, Fred H, 1219-21 Michigan Ave., Chicago, Ill.

KNIGHT & Co., H. C., 1725 Michigan Ave., Chicago, Ill. (See page 235.)

LASCO—See London Auto Supply Co.

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill. "Beecher," "Schildback," "Voltz."

LONDON Auto Supply Co., 1235 Michigan Ave., Chicago, Ill. "Lasco." (See page 457.)

LORING & Son, J. W., Worcester, Mass. (See page 235.)

LYONS & Co., Hugh, Lansing, Mich.

McGIFFIN—See Automobile Specialty Co.

MANHATTAN Auto Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MEZGER, C. A., 1629 Broadway, New York, N. Y. "Automatic."

MICHIGAN Top Co., 17 Duffield St., Detroit, Mich. (See page 273.)

MILBRADT Mfg. Co., 1436 N. Eighth St., St. Louis, Mo.

MILLWOOD Mfg. Co., 55th St. & S. Park Ave., Chicago, Ill.

MONARCH Auto Top & Supply Co., 1218-20 Michigan Ave., Chicago, Ill.

MOTOR Specialty Co., 239 Jefferson Ave., E. Detroit, Mich.

NATIONAL Auto Top Co., 1904 Broadway, New York, N. Y. (See page 277.)

NEW England Auto Top Co., 229 W. 54th St., New York, N. Y. (See page 397.)

NEW HAVEN—See Holcomb Co.

NONPAREIL Brass Co., 143 Summer St., Providence, R. I. (See page 391.)

PARSONS-CURTIS Top Co., 70 W. Jackson Blvd., Chicago, Ill.

PERFECT—See Fellwock Automobile & Mfg. Co.

PHELPS Auto Top & Trimming Co., F. Z., 1292 Niagara St., Buffalo, N. Y.

RACINE Buggy Top Co., Racine, Wis.

RANDS Mfg. Co., 51-55 Macomb St., Detroit, Mich.

RILEY Bros., Bridgeton, N. Y.

ROSS & Browne, 6127-29 Cottage Grove Ave., Chicago, Ill.

RUSSELL, H. J., 32 Exchange St., Worcester, Mass. "Angle."

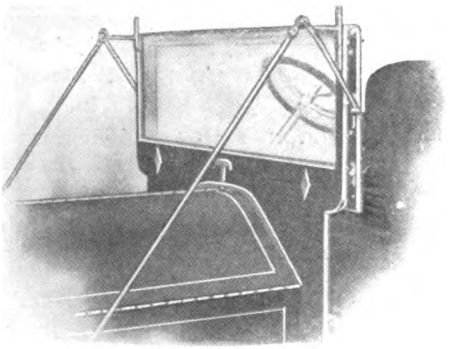
SCHILDBACK—See Limousine-Carriage Mfg. Co.

SIMPLICITY Windshields Co., 1655 Jos. Campau Ave., Detroit, Mich.

SMITH & Co., Jos. N., 154-62 Fourth St., Detroit, Mich. "Ackerman," "Favorite."

SMITH Machine Co., H., 51 Godwin St., Paterson, N. J.

Complete Index to Classification appears on Pages 7 to 18.



Improved Wind Shield

Our Latest Model, Patent Applied For

Very light. Nothing simpler or better in the world. All metal parts solid brass. Perfectly solid when top glass is up. Entire top folds down behind the lower half. Adjusted by two thumb screws. Cannot rattle. Crystal plate 3-16 inch glass in both frames. Frames of mahogany; brass bound. Center rail made of grooved sections of rectangular brass tubing that are light, strong and unobtrusive.

Price Complete and Fitted to Car $50

Liberal Discount to automobile m'f'rs and dealers

Chicago Coach & Carriage Co.

Manufacturers

Also builders of the Duer high wheel runabout limousine bodies and automobile parts generally

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"BANKER"

Wind Shield No. 2—The Best

Wind Shield in the world, the only shield manufactured that has a single or double fold over the hood without the line of vision obstructed across the center of the glass. Folds flat entirely out of the way when you want it down. Made to fit any automobile. Write for full description and price. Agents wanted.

BANKER BROS. CO., Mfrs.

Baum and Beatty Sts., PITTSBURG, PA.

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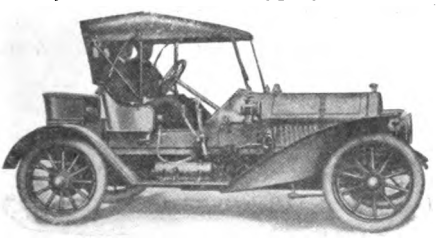


1903 STANDARD TOURING CAR 1[illegible]

STERLING SPECIALTIES

TOPS, ROBE FOOT RAILS

Automobile Trimmings, Lamp and Tire Casing Covers

WINDSHIELDS

OIL GUNS, LAMP BRACKETS, BODY IRONS

LAMPS

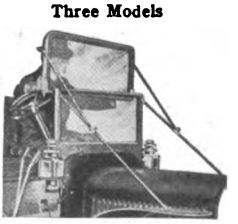
Our Superior Facilities and Large Capacity insure PROMPT SERVICE HIGH GRADE GOODS, LOWEST POSSIBLE PRICES

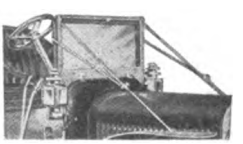
Give us a call and we'll save you money

AUTO ACCESSORIES MFG. CO.

Detroit Michigan

DIVIDED WINDSHIELDS
Three Models





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SHIELDS (Continued)

GLASS WIND SHIELDS (Continued)

SPRAGUE Umbrella Co., Norwalk, O.

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O.

STERLING—See Auto Accessories Mfg. Co.

STUDEBAKER Bros. Mfg. Co., 373 Wabash Ave., Chicago, Ill.

TABOR Auto-Folding Glass Front Co., 201 E. Seventh St., Los Angeles, Cal.

TROY Carriage Sunshade Co., Troy, O. (See page 235.)

TWENTIETH Century Garage, So. Bend, Ind. "Williams." (See page 255.)

VANGUARD Mfg. Co., Joliet, Ill.

VOLTZ—See Limousine-Carriage Mfg. Co.

WHEELER—See Detroit Auto Shield Co.

WILLIAMS—See Twentieth Century Garage.

WOOD & Son, Frederick R., 217 W. 19th St., New York, N. Y.

SHOCK ABSORBERS

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS

ACME Spring Check Co., 1717 Broadway, New York, N. Y. "Shocsorber." (See page 459.)

AUTO-CUSHION—See Mellen-Edwards Co.

BALDWIN Chain & Mfg. Co., Worcester, Mass. "House." (See page 87.)

BUFFALO Specialty Co., 873 Ellicott St., Buffalo, N. Y. "Thomas." (See page opposite.)

CIGLIA Shock Preventer Co., 176 W. 72d St., New York, N. Y.

COLUMBIA—See Doront, Frank.

COMSTOCK Shock Absorber Co., Thoroughfare Bldg., New York, N. Y.

DORONT, Frank, 68 Pearl St., Paterson, N. J. "Columbia."

DU-RO—See Robinson, Duncan.

F. R. V. Auto Parts Co., Thoroughfare Bldg., New York, N. Y.

FLENTJE, Ernst, 1643 Cambridge St., Cambridge, Mass.

FOSTER—See Gabriel Horn Mfg. Co.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O. "Foster."

HARTFORD Suspension Co., 139 Bay St., Jersey City, N. J. "Truffault-Hartford." (See page 243.)

HERCULES Auto Specialty Mfg. Co., 115 Dearborn St., Chicago, Ill.

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. "Pater-Noster." (See yellow insert.)

HOUSE—See Baldwin Chain & Mfg. Co.

INDIANAPOLIS Bolster Spring Co., 326 W. Georgia St., Indianapolis, Ind.

KIDDER, Wellington P., (Jamaica Plain) Boston, Mass.

MEARS & Co., B. C., 1300-04 E. Lexington St., Baltimore, Md. "Velvet."

MELLEN-EDWARDS Co., Beloit, Wis. "Auto-Cushion." (See page 175.)

NAPOLEON—See Oil Tempering Spring Co.

NEW York Wire & Spring Co., 71 Park Ave., Hoboken, N. J.

OIL Tempering Spring Co., Chicopee Falls, Mass. "Napoleon."

PARFREY Shock Absorber Co., 24 West St., New York, N. Y.

PATER-NOSTER—See Herz & Co.

ROBINSON, Duncan, 89 State St., Boston, Mass. "Du-Ro."

RUCKERT Compound Shock Absorber Co., 66 Leonard St., N. Y. City.

SAGER Co., J. H., 265 South Ave., Rochester, N. Y.

SHIPPEY Co., Geo. E., Pittsfield, Mass.

SHOCSORBER—See Acme Spring Check Co.

SPRING Strap Co., 3 E. Huron St., Chicago, Ill. (See page 41.)

STOLP, Oscar, 20-22 Fletcher St., New York, N. Y. (See page 497.)

SUPPLEMENTARY Spiral Spring Co., St. Louis, Mo. (See page 411.)

THOMAS—See Buffalo Specialty Co.

TRIPLE Action Spring Co., 65 E. 21st St., Chicago, Ill. (See page 247.)

TRUFFAULT - HARTFORD — See Hartford Suspension Co.

VELVET—See Mears & Co.

VICTOR Shock-Absorber Co., 1937 Broadway, New York, N. Y.

WEEBER Mfg. Works, C. F., Albany, N. Y.

SHOES

INNER TIRE SHOES

(Shoes or Sleeves to be used between outer shoe and inner tube as a protector and reinforcement. For Outer Shoes or Manchons—See Sleeves, Tire Repair)

ATLAS Rubber Co., Buffalo, N. Y. (See page 271.)

BARRELL Pneumatic Tire Protector Co., 114 State St., Boston, Mass.

COX, David H., Rahway, N. J.

GRAYS—See Standard Leather Washer Mfg. Co.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans. (See page 269.)

INNER Shoe Tire Co., 64 Monroe St., Grand Rapids, Mich. "Innershu."

INNERSHU—See Inner Shoe Tire Co.

JENKINS Specialty Mfg. Co., 37 N. Main St., Sumter, S. C.

MANNING Mfg. Co., Holyoke, Mass.

MARKS—See Middlesex Co.

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BUMP-I-TY BUMP! RIP-I-TY RIP!!

UP AGAIN, DOWN AGAIN ON AGAIN, AND REPEAT

This is every autoist's nerve-racking experience UNLESS his car is equipped with THOMAS SHOCK ABSORBERS. If it is, the whole tune is changed.

Why are Thomas Shock Absorbers Displacing High-Priced Compli cated Makes? Think it Over

THEY SAVE TIME THEY SAVE TIRES THEY SAVE THIS

THOMAS SHOCK ABSORBERS

positively eliminate upthrow. This means easier riding—more speed—less wear on tires—no broken springs and fewer repairs. They do not interfere with natural downward action of springs. Easily attached to all cars; no adjusting necessary. Act instantly no matter how fast shocks may come. Equally adapted for either elliptic or half spring cars. Experts say THOMAS SHOCK ABSORBERS are perfect; they have tried them and know. M d: in three sizes to fit all cars.

It makes no difference how many so called shock absorbers you have used, you don't know one half the joys of automobiling unless you have tried THOMAS SHOCK ABSORBERS—they're simply wonderful.

Send for our 30 days' free trial proposition and enjoy real automobiling at our expense.

BUFFALO SPECIALTY COMPANY

373 Ellicott Street **Buffalo, N. Y.**

Also Makers of Automobile Liquid Veneer and Shinebright Metal Liquid

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SHOES (Continued)

INNER TIRE SHOES (Continued)

MIDDLESEX Co., N. Y. Life Bldg., New York, N. Y. "Marks."

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

TRAVER Blow-out Patch Co., Thoroughfare Bldg., New York, N. Y. (See page 223.)

WABAN Webbing Co., 16 South St., Boston, Mass.

SIGHT-FEEDS

INDEPENDENT SIGHT-FEEDS

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

GREENE, Tweed & Co., New York, N. Y.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McCORD & Co., Detroit, Mich. (See page 423.)

NUGENT & Co., Wm. W., 18-30 W. Randolph St., Chicago, Ill.

PEDERSEN Mfg. Co., 400-12 E. 37th St., New York, N. Y. (See page 171.)

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

SILK

SPOOL SILK

MEYER & Co., John C., Lowell, Mass.

UPHOLSTERY SILK

CHENEY Bros., S. Manchester, Conn.

FULTON & Co., G. W., Paterson, N. J.

ROBERTSON, W. J., Paterson, N. J.

SLEEVES

TIRE REPAIR SLEEVES OR BANDS

(For lacing or strapping around a tire to cover a puncture or blowout. For Sleeves to be used between inner tube and outer shoe —See Shoes, Inner Tire)

ADWEAR Auto Tire Sleeve Co., High & Washington Sts., North Attleboro, Mass.

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass. (See page 53.)

CHICAGO Rawhide Mfg. Co., 75-77 Ohio St., Chicago, Ill.

COOK & Bro., E. C., 49 E. Kinzie St., Chicago, Ill.

COX, David H., Rahway, N. J.

EMPIRE Automobile Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

GILBERT Mfg. Co., New Haven, Conn. (See page 265.)

GOODRICH Co., B. F., Akron, O.

GORDON—See Vehicle Apron & Hood Co.

GRATON & Knight Mfg. Co., 94-104 Bloomingdale Road, Worcester, Mass. (See page 271.)

GRAYS—See Standard Leather Washer Mfg. Co.

HEALY Leather Tire Co., 90 Gold St., New York, N. Y. (See page 441.)

KIMBALL Tire Case Co., 171 Broadway, Council Bluffs, Ia.

M. & M. Mfg. Co., Akron, O. (See page 38.)

MESINGER Mfg. Co., H. & F., 1801 First Ave., New York, N. Y.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J. "Grays."

VEHICLE Apron & Hood Co., Columbus, O. "Gordon." (See page 135.)

SOAPS

AUTOMOBILE SOAPS

(See also Polishes, Automobile)

AMALIE—See Sonneborn Sons.

AMERICAN Oil Co., Jackson, Mich. "Amoco." (See page 383.)

AMOCO—See American Oil Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich.

BLUE RIBBON—See International Metal Polish Co.

BUCKEYE—See Davies Co.

COLUMBIA Lubricants Co., 116 Broad St., New York, N. Y. (See page 165.)

CROWN Soap Co., 1941-43 W. Fayette St., Syracuse, N. Y. "Royal Crown." (See page opposite.)

DAVIES Co., J. P., Dayton, O. "Buckeye."

FAIRCHILD & Bro., M. H., 199 Michigan St., Chicago, Ill.

FISK Mfg. Co., Springfield, Mass.

GENERAL Refining Co., American Trust Bldg., Cleveland, O. "Gereco."

GERECO—See General Refining Co.

GREEN Oil Soap Co., 92 Market St., Chicago, Ill.

HOLLINGSHEAD Co., R. M., Camden, N. J

HOOSIER Mfg. Co., 372 S. Illinois St., Indianapolis, Ind. "Knoxall."

INTERNATIONAL Metal Polish Co., Indianapolis, Ind. "Blue Ribbon." (See page opposite.)

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HANDS GRIMY?

GRE-SOLVENT

"MILES AHEAD OF SOAP"

The standard and highest quality for six years. Free sample on request.

10 oz.	.	$ .10
32 oz.	.	.25
4 lb.	.	.50
9 lb.	.	1.00

It is necessary to caution the public against numerous cheaply-made imitations, injurious to the skin. There is only one genuine Grease-Solvent and that is Gre-Solvent.

Correspondence solicited.

THE UTILITY CO.,

639 West 44th Street, New York City

IT'S UP TO YOU TO TRY

BLUE RIBBON CREAM

METAL POLISH

Ask For

F R E E

S A M P L E

It outshines them all.

Don't use the ordinary "DOPE."

BLUE RIBBON does what you want it to do.

It is a Thick Oil Cream Polish—an Emulsion. No shaking. No work. No worry. Benefits all metals.

Every can guaranteed.

INTERNATIONAL METAL POLISH CO.

INDIANAPOLIS, IND.

Not a "Parody," but a "Soap-Ode-Y."

Mary had an Automobile,
Which was her most cherished hope,
And every time she used that car
It cried for "Soapy Soap."

She tried them all, yes, every one,
Which had more or less renown;
Concluded the only NEUTRAL one
Was styled the "ROYAL CROWN."

She ordered this as a last resort,
And found it did not tarnish
Finest furniture, her "six thousand car"—
Nor even dimmed the varnish.

A wise conclusion for her and you
All others to abolish,
And, after this, no substitute
For ROYAL CROWN SOAP AND POLISH.

Write for Prices

MADE ONLY BY

CROWN SOAP COMPANY

1941-43 W. Fayette Street

SYRACUSE, N. Y.

H. W. Bogen, Inc., 460 Golden Gate Ave., San Francisco, Cal. Distributors for Pacific Coast.

Robert J. Campbell, Catte de Vergara, Mexico, Mexico. Distributor for Republic of Mexico.

"How Bright and Clean"

Yes, that's what you hear when you use

M&V CLEANER and POLISH

THE BEST BODY POLISH ON THE MARKET

WHY?

It cleans and polishes at the same time and doesn't leave the surface sticky or gummy

and

M&V METAL POLISH

THE BEST METAL POLISH ON THE MARKET

WHY?

It works quick, can be used on hot or cold metal and gives a lasting polish

If your supply house doesn't carry them write us

MORHOUS MANUFACTURING CO.

DETROIT, *Where Life is Worth Living*

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SOAPS (Continued)

AUTOMOBILE SOAPS (Continued)

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass. "Olivine."

KIRK & Co., James S., N. Water St., Chicago, Ill.

KLENO Mfg. Co., N. Weymouth, Mass.

KNOXALL—See Hoosier Mfg. Co.

LINOSOAP Co., 942-44 W. Fifth St., Cincinnati, O.

MACLEAN-BRANDON Oil & Supply Co., 65 Long Wharf, Boston, Mass.

MOBO—See Stanley, John T.

MODOC Co., Ft. of Market St., Chester, Pa.

MODOC Soap Co., 228 N. Fourth St., Philadelphia, Pa. "Perfecto."

MONAHAN Antiseptic Co., 92 Market St., Chicago, Ill.

MURPHY'S—See Phoenix Oil Co.

NATIONAL Tripoli Co., 15 Jay St., New York, N. Y.

OLIVINE—See Kenney Mfg. Co.

P. N. S. Co., 2031-33 N. 29th St., Philadelphia, Pa.

PERFECTO—See Modoc Soap Co.

PHOENIX Oil Co., 23d St. & North River, New York, N. Y. "Murphy's."

PURITAN Soap Co., 502 Exchange St., Rochester, N. Y.

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Star."

ROBERTSON & Co., J. F., Manchester, Conn.

ROYAL CROWN—See Crown Soap Co.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie." (See page 211.)

SPEARS Sons' Co., Alden, 369 Atlantic Ave., Boston, Mass.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J.

STANLEY, John T., W. 30th St., New York, N. Y. "Mobo."

STAR—See Richmond & Co.

SWEET, Chas. F., Pearl & Haynes Sts., Hartford, Conn.

TAYLOR Mfg. Co., 468 Main St. (Charlestown), Boston, Mass.

WASHZUM—See White & Bagley Co.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Washzum."

WHITE Star Refining Co., 58-60 Carroll St., Buffalo, N. Y.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J. (See page 383.)

HAND SOAPS AND PASTES

BAUM'S Castorine Co., Rome, N. Y.

BOYER Bros. Mfg. Co., 60 Wall St., New York, N. Y.

BROWN Soap Co., Michigan & Buttles Sts., Columbus, O. "Skidoo."

CEDAROLEUM Co., Perkinsville, Vt.

CLEANZUM—See White & Bagley Co.

CROSS, W. H., 162 Chambers St., New York, N. Y. "Uneedit."

ERICKA Mfg. Co., 882 Liberty St., Springfield, Mass.

FINGA-BRITE—See Rath Mfg. Co.

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

FROST, F. E. 505 Main St., Worcester, Mass. "Kuick Klean."

GRE-SOLVENT—See Utility Co.

GREEN Oil Soap Co., 92 Market St., Chicago, Ill.

HYDRO-PALM Soap Co., 22 Minott St., Neponsett, Mass.

JERGENS Co., Andrew, Cincinnati, O.

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KIRK & Co., James S., Chicago, Ill.

KLENO Mfg. Co., N. Weymouth, Mass.

KLENZOLA Co., 1302 Peach St., Erie, Pa.

KUICK-KLEAN—See Frost, F. E.

LAVA—See Waltke & Co.

RATH Mfg. Co., Hedley St., Philadelphia, Pa. "Finga-Brite."

ROBERTSON & Co., J. F., Manchester, Conn.

ROME Soap Mfg. Co., Rome, N. Y.

SHOFO—See Stanley, John T.

SKAT Mfg. Co., 791 Park St., Hartford, Conn.

SKIDOO—See Brown Soap Co.

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J.

STANLEY, John T., W. 30th St., New York, N. Y. "Shofo."

UNEEDIT—See Cross, W. H.

UTILITY Co., 639 W. 44th St., New York, N. Y. "Gre-Solvent." (See page 241.)

WALTKE & Co., Wm., Grand & Second Sts., St. Louis, Mo. "Lava."

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Cleanzum."

SOCKETS

BOW SOCKETS

(See also Irons, Slat)

AJAX—See Cortland Forging Co.

ASHTABULA Bow Socket Co., 99-101 Prospect St., Ashtabula, O. (See page opposite.)

CLEVELAND Hardware Co., 45th St. & Lakeside Ave., Cleveland, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y. "Ajax."

CRANDALL, Stone & Co., Binghamton, N. Y.

METAL Stamping Co., 243 West St., New York, N. Y.

SCHERER & Co., H., 280 Jefferson Ave., Detroit, Mich.

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SOCKETS OF ESTABLISHED REPUTATION

Unequalled for Strength, Style, Proportion and Symmetry, Quality and Durability

We are the oldest makers in this line, having been making carriage bow sockets for over a quarter of a century.

When the automobile folding top came into vogue we were the first manufacturers to make bow sockets especially for automobile tops.

The principles and processes involved in making automobile bow sockets were invented and perfected by us.

Ashtabula Bow Sockets for automobiles are not modified carriage bow sockets, but are designed especially for the purpose they serve.

Our bow sockets are as perfect as can be made. Every detail has been carefully studied and worked out, and the "Ashtabula Kind" are to-day without a rival.

The confidence shown by most of the best makers of cars in using the Ashtabula Bow Sockets is proof enough, but we would be pleased to demonstrate their superiority on your cars.

Full information, styles, and samples will be furnished on request. In your own interest write to us

The ASHTABULA BOW SOCKET COMPANY
ASHTABULA, OHIO

VICTORY AT SAVANNAH for TRUFFAULT-HARTFORD SHOCK ABSORBERS

Wagner wins Grand Prize using Truffault-Hartford Shock Absorbers. His Fiat car, Truffault-Hartford equipped inished first, covering the

402 Miles at the Rate of 65.5 Miles an Hour

A new American record for road racing.

Wagner, among the most successful professional drivers of the world, never drives without Truffault-Hartfords n his car. He used them when he won the 1906 Vanderbilt Cup Race in a Darracq.

THE LANCIA CAR driven by Hilliard and equipped with Truffault-Hartford Shock Absorbers won the International Light Car Race at Savannah—196 miles in 3 hours, 43 minutes and 33 seconds, at the rate of 52.6 miles per hour.

The extraordinary speed maintained in both races was made possible by the use of the Truffault-Hartford Shock Absorbers, which absorbed all vibration, jolt and jar and minimized the wear and tear on the tires. Any automobile, whether it be a racer, touring car, a roadster or a runabout, can be made smoother running, more comfortable, by the use of the Truffault-Hartford Shock Absorbers. Made in three sizes:

Standard, for cars over **1800** lbs. (per set of four) **$60.00**
Intermediate, for cars from **1200-1800** lbs. (per set of four) **40.00**
Junior, for smaller cars runabouts, weighing up to **1200** lbs. (per set of four) **25.00**

Complete fittings furnishe without extra cost. Mention make, model and year of car when orbering.

HARTFORD SUSPENSION CO., 139 Bay Street, Jersey City, N. J.

BRANCHES: New York, 212-214 W. 88th St.; Boston, 319 Columbus Ave.

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SPEEDOMETERS

AMERICAN—See Stewart & Clark Mfg. Co.

AUTO Improvement Co., 316 Hudson St., New York, N. Y. "Ever Ready."

AUTO-METER—See Warner Instrument Co.

BULLARD Specialty Co., 778 State St., Springfield, Mass. (See page 397.)

EVER READY—See Auto Improvement Co.

HICKS Speed Indicator Co., 1263 Atlantic Ave., Brooklyn, N. Y.

HOFFECKER Co., Park Square Motor Mart, Boston, Mass.

INDEX Speed Indicator Co., Hennepin & Seventh Sts., Minneapolis, Minn.

JONES Speedometer Co., New Rochelle, N. Y.

JONES, W. H., 147 Columbus Ave., Boston, Mass.

JONES, William S., Drexel Bldg., Philadelphia, Pa. "Lea."

LEA—See Jones, William S.

LIPMAN Mfg. Co., 210 Pleasant St., Beloit, Wis.

LITTLEFIELD Mfg. Co., W. S., 134 Eliot St., Boston, Mass.

LOMBARDI Motor Co., Derby, Conn.

LORING Speed Gauge Co., 91 Marshall St., Somerville, Mass.

MILLER Speedometer Co., 97 Reade St., N. Y. City.

NIAGARA Tachometer & Instrument Co., 26th & Adams Sts., Niagara Falls, N. Y.

PARKER Mfg. Co. Albany Bldg., Boston, Mass. "Standard."

PEERLESS Specialty Co., 1876 Broadway, New York, N. Y.

PERFECT—See Smith & Son.

RECOMETRE Co. of Am., Broadway & 74th St., New York, N. Y.

SMITH & Son, S., 116 Broad St., New York, N. Y. (Importers). "Perfect."

STANDARD—See Parker Mfg. Co.

STAR Speedometer Co., Danville, Pa.

STEWART & Clark Mfg. Co., 514 Diversey Blvd., Chicago, Ill. "American." (See page opposite.)

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

WARNER Instrument Co., 341 Wheeler Ave., Beloit, Wis. "Auto-Meter." (See page 221.)

SPOKES

WIRE SPOKES

STANDARD Co., Torrington, Conn. (See page 409.)

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

SPRAGS

DROP SPRAGS

(See Brakes, Drop)

SPRINGS

LEAF SPRINGS

AMERICAN Spiral Spring Mfg. Co., 58 Butler St., Pittsburg, Pa.

ARMSTRONG Mfg. Co., J. B., Flint, Mich.

BURGESS, Jr., Chas., Wenona, Ill.

BURNET Compound Spring, Inc., 73 Broad St., Newark, N. J. (See page 435.)

CLEVELAND-CANTON Spring Co., Canton, O. (See page 435.)

DELANEY & Son, D., Liberty & Hamilto Sts., Newark, N. J.

DETROIT Steel Products Co., 89 Fort St., Detroit, Mich.

DRAGON—See Sheldon Axle Co.

FOREST City Spring Works, Maine Ave. Center St., Cleveland, O.

FORT Pitt Spring & Mfg. Co., Farmer Bank Bldg., Pittsburg, Pa.

GARDEN City Spring Works, E. 20th St Santa Fe R. R., Chicago, Ill.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

HARVEY Spring Co., Racine, Wis.

HESS-PONTIAC Spring & Axle Co., Pontiac Mich.

HIGGINS Spring & Axle Co., Racine, Wis.

INTERNATIONAL Engineering Co., 177 Broadway, New York, N. Y. (Importers.) "Lemoine." (See page 325.)

IRON City Spring Co., 510 Allegheny Ave (North Side), Pittsburg, Pa.

KALAMAZOO Spring & Axle Co., Portage St., Kalamazoo, Mich.

KEYSTONE Spring Works, 1301 Buttonwood St., Philadelphia, Pa.

KING Spring Co., Buffalo, N. Y.

KOEHLER—See Universal Auto Spring Co.

LAVALETTE & Co., 112-14 W. 42d St., New York, N. Y. (Importers). "Lemoine." (See page 479.)

LEMOINE—See International Engineering Co.

LEMOINE—See Lavalette & Co.

LEWIS Spring & Axle Co., Jackson, Mich. (See page 43.)

MERRILL Spring Co., E. R., 530 West 28th St., New York.

NEW York Spring & Axle Co., 860 11th Ave., New York, N. Y.

PENN Spring Works, Baldwinsville, N. Y.

PERFECTION Spring Co., Cleveland, O. (See page 425.)

ROWLAND, Wm. & Harvey, Frankfort, Philadelphia, Pa.

SHELDON Axle Co., Wilkes-Barre, Pa. "Dragon." (See page 229.)

Complete Index to Classification appears on Pages 7 to 18.

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THEY'RE WITH US

Stewart and American SPEEDOMETERS

are SOLD, ENDORSED and RECOMMENDED by more than 95 per cent of the automobile accessory JOBBERS and DEALERS throughout the United States, Canada and Great Britain.

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Stewart & Clark Mfg. Co.

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SPRINGS (Continued)

LEAF SPRINGS (Continued)

SHULER & Son, Davis W., Amsterdam, N. Y.

SPRING Perch Co., 232 John St., Bridgeport, Conn.

SUPPLEMENTARY Spiral Spring Co., St. Louis, Mo.
(See page 411.)

THOMAS Spring Works, Canisteo, N. Y.

TRIPLE Action Spring Co., 65 E. 21st St., Chicago, Ill.
(See page opposite.)

TROY Spring Works, 394-96 Congress St., Troy, N. Y.

TUTHILL Spring Co., 213 W. Polk St., Chicago, Ill.
(See page 435.)

UNIVERSAL Auto Spring Co., 3100 N. Broadway, St. Louis, Mo. "Koehler."

MACHINERY SPRINGS

AMERICAN Spiral Spring Mfg. Co., 568 Butler St., Pittsburg, Pa.

AMERICAN Steel & Wire Co., The Rookery, Chicago, Ill.

BARNES Co., Wallace, Bristol, Conn.
(See page 421.)

CARY Spring Works, 240 W. 29th St., N. Y. City.

CHATILLON & Sons, John, New York, N. Y.

CLEVELAND Wire Spring Co., Hamilton Ave. & E. 38th St., Cleveland, O.
(See page 419.)

DUNBAR Bros. Co., Bristol, Conn.
(See page 425.)

EUREKA Spring Co., 347 Broadway, New York, N. Y.

FISCHER Spring Co., Chas., 145 Center St., New York, N. Y.

FORT Pitt Spring & Mfg. Co., Farmers' Bank Bldg., Pittsburg, Pa.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill.
(See page 421.)

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

HEBB, George A., 70 William St., Newark, N. J.

HUBBARD Spring Co., M. D., Pontiac, Mich.
(See page 421.)

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

MANROSS, F. N., Forestville, Conn.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y.

MORGAN Spring Co., Worcester, Mass.
(See page 421.)

NEW York Wire & Spring Co., 71 Park Ave., Hoboken, N. J.

RAILWAY Steel Spring Co., New York, N. Y.

RAYMOND Mfg. Co., W. Church St., Corry, Pa.

SABIN Machine Co., Montpelier, Vt.

TUCK Mfg. Co., 74 Ames St., Brockton, Mass.

SEAT OR UPHOLSTERY SPRINGS

BARBER Mfg. Co., Anderson, Ind. "Cardinal."
(See page opposite.)

BARNES Co., Wallace, Bristol, Conn.
(See page 421.)

CARDINAL—See Barber Mfg. Co.

CLEVELAND Wire Spring Co., Hamilton Ave. & E. 38th St., Cleveland, O.
(See page 419.)

D'ARCY Spring Co., Kalamazoo, Mich.

DETROIT Wire Spring Co., Detroit, Mich.
(See page 419.)

EXCELSIOR—See Trenton Spring & Mattress Co.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill.
(See page 421.)

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

HUBBARD Spring Co., M. D., Pontiac, Mich.
(See page 421.)

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

JACKSON Cushion Spring Co., Jackson, Mich.

KELLEY & Co., E., 509 Main St., Worcester, Mass. "Union."

LACE WEB—See Trenton Spring & Mattress Co.

METAL Stamping Co., 243 West St., New York, N. Y.

MORGAN Spring Co., Worcester, Mass.
(See page 421.)

MURRAY Spring Co., Wm. A., Cincinnati, O.

NATIONAL Spring & Wire Co., Albion, Mich., & St. Catherines, Ont.
(See page 419.)

NEW YORK Wire & Spring Co., 71 Park Ave., Hoboken, N. J.

ROUGH RIDER—See Ventilated Cushion & Spring Co.

STAPLES & Hanford Co., Newburgh, N. Y.

TRENTON Spring & Mattress Co., Trenton, N. J. "Excelsior," "Lace Web."

UNION—See Kelley & Co.

VENTILATED Cushion & Spring Co., Jackson, Mich. "Rough Rider."
(See page 419.)

WING Co., Charles, 5 Water St., Amesbury, Mass.
(See page 425.)

SUPPLEMENTARY SPRINGS

(See Shock Absorbers)

The Spring Problem Solved at Last.

TRIPLE ACTION SPRINGS

Gives Easy Riding Qualities to Any Car

THEY HELP SELL CARS

Type 1.

Vibration absorbed. Life of Tire greatly prolonged, whether over rough roads or good. Life and efficiency of Engine positively increased at least 50 per cent. Less road resistance. Greater speed. Less fuel consumed. Nothing to get out of order in any particular. No parts to adjust or oil. Absolutely eliminates Broken Side Springs because of uniform tension.

Our "Type 12" is attachable to any hanger and consists of a scroll plate provided at one end with a socket head for connection with the spring on the car, the other end supporting a compression coil, which in turn supports the hanger or stud of the frame. This little spring works wonders in absorbing vibration or jar of stiff springs, as something like 50 *inches of coil and scroll are interposed between your springs and frame.*

Auto Manufacturers and Repairmen and Dealers

Triple Action Springs are fitments auto owners appreciate—they improve a car really wonderful. They are the best investment that can possibly be made.

Type 11—Spring.

Write to-day for full particulars and special terms to Manufacturers and dealers.

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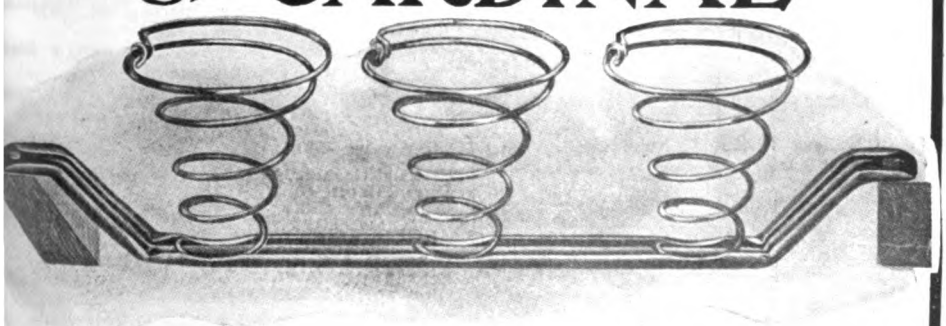
The CARDINAL



The Ideal Cushion and Seat Spring. Maximum Strength with Minimum Weight and Material. . . Perfect Construction.

ALL spirals in our spring work are made from the highest grade of spring wire, re-tempered, making it particularly strong and elastic. The spirals are firmly seated in a tempered steel arch with edges turned upward. They are absolutely noiseless, with greatest strength and durability. The very severest punishment the cushion may receive will not strain or injure it.

"The Cardinal" is shipped to you finished and ready for the frame—not more than thirty seconds required to spring the seat.

In your own interests, get full particulars and prices—it will pay you

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ANDERSON, INDIANA, U. S. A.

SPROCKETS

MACHINED SPROCKETS

(For Sprocket Blanks—See Castings; also Forgings) also Gears, Blank)

BALDWIN Chain & Mfg. Co., Worcester, Mass.
(See page 87.)

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 127.)

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y.
(See page 129.)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

COLLMER Bros., 105 Vistula Ave., South Bend, Ind.

CULLMAN Wheel Co., 1020 Greenwood Terrace, Chicago, Ill.
(See page 251.)

DIAMOND Chain & Mfg. Co., 231 West Georgia st., Indianapolis, Ind.
(See page 85.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

FORG, Peter, Somerville, Mass.
(See page 317.)

GRANT Gear Works, 6 Portland St., Boston, Mass.

HIGH Wheel Auto Parts Co., Muncie, Ind. "Wide Range."

PARISH & Bingham Co., Cleveland, O.
(See page 121.)

SIER-BATH Co., 145 W. 54th St., New York, N. Y.
(See page 127.)

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 217.)

THROOP Perforating Co., 80 Terrace, Buffalo, N. Y.

WIDE RANGE—See High Wheel Auto Parts Co.

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

STAMPINGS

STEEL STAMPINGS

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn.
(See page 225.)

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 357.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BAY State Stamping Co., 380 Chandler St., Worcester, Mass.

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

BOWEN Mfg. Co., 16 Canal St., Auburn, N. Y.

CASSADY-FAIRBANKS Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CROSBY Co., Buffalo, N. Y.
(See page opposite.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 119.)

FORG, Peter, Somerville, Mass.
(See page 317.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOUGHTON Mfg. Co., 81-89 Exchange St., Worcester, Mass.

HYDRAULIC Pressed Steel Co., Cleveland, O.
(See inside back cover.)

INDESTRUCTIBLE Steel Wheel Co., 1221 Michigan Ave., Chicago, Ill.
(See page 447.)

JANNEY, Steinmetz & Co., Fourth & Market Sts., Philadelphia, Pa.

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 499.)

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y.
(See page 157.)

MOSSBERG Co., Frank, Attleboro, Mass.

NORTMANN-DUFFKE Foundry Co., 26th & Layton Aves., Milwaukee, Wis.

PARISH & Bingham Co., Cleveland, O.
(See page 121.)

PARISH Mfg. Co., 7th & Chestnut Sts., Reading, Pa.

REINKE & Shirray Mfg. Co., 441-53 Lafayette Blvd., Detroit, Mich.

ROYAL Enameling & Stamping Works, Desplaines, Ill.

SMITH Co., A. O., 241 Clinton St., Milwaukee, Wis.
(See page 123.)

SNOW, B. W., 132 Bissell St., Syracuse, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich.
(See page 499.)

STERLING Machine & Stamping Co., Vermillion, O.
(See page 459.)

TURNER Brass Works, Sycamore, Ill.

WALTER & Sons, N. C., 194 William St., New York, N. Y.
(See page 493.)

WORCESTER Pressed Steel Co., Barbers Crossing, Mass.
(See page 339.)

STARTERS

AUTOMATIC GAS ENGINE STARTERS

ALEXANDER & Cox Co., Ogden and Western Aves., Chicago, Ill. "Hobbs."

AUTO Improvement Co., 316 Hudson St., New York, N. Y. "Ever Ready."

B. G. & R.—See Mercedes Motor Mfg. Co.

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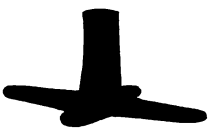
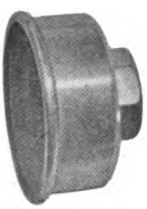
THE CROSBY CO.

BUFFALO, N. Y.

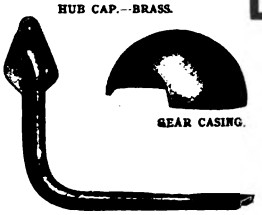
BRAKE DRUM



STEERING POST BRACKET.

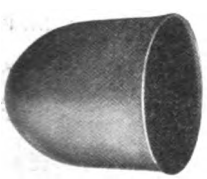


HUB CAP.—BRASS.



GEAR CASING.

STEP HANGER.—TOURING CAR.



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PROMPT DELIVERY

Send us your blue prints for prices, Stating Quantity.

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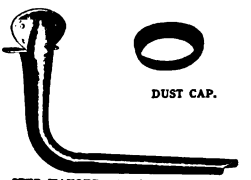
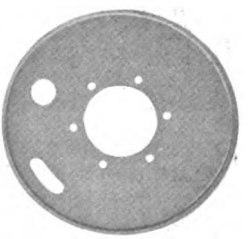


DUST CAP.

STEP HANGER.—RUNABOUT CAR.



BRAKE DISC.

HUB FLANGE.

AXLE SLEEVE.

MUFFLER DRUM.

BEARING CASE

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STARTERS (Continued)

AUTOMATIC GAS ENGINE STARTERS (Continued)

BALL, F. H. & F. O., Plainfield, N. J.

BEAMER—See Churchill-Lee Co.

CHURCHILL-LEE Co., 907-9 Michigan Ave., Detroit, Mich. "Beamer." (See page 151.)

DE SOUCHET Motor Appliance Co., 324 Dearborn St., Chicago, Ill.

EVER READY—See Auto Improvement Co.

GARDNER, Dell B., Chicago, Ill.

HOBBS—See Alexander & Cox Co.

HUB Automobile Co., 95 Freeport St., Boston, Mass. "Taylor-Davis."

KANE Starting Device Co., 762 Junction Ave., Detroit, Mich.

MERCEDES Motor Mfg. Co., New Kensington, Pa. "B. G. & R." (See page 413.)

MONARCH Motor Mfg. Co., 1592-1600 N. Halsted St., Chicago, Ill.

TAYLOR-DAVIS—See Hub Automobile Co.

STEEL

ANGLE, CHANNEL AND TEE IRON OR STEEL

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

EASTERN Steel Co., Pottsville, Pa.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

INLAND Steel Co., 1st National Bank Bldg., Chicago, Ill.

JONES & Laughlin's Steel Co., Pittsburg, Pa.

LOCKHART Iron & Steel Co., McKees Rocks, Pa.

LOGAN Iron & Steel Co., Harrison Bldg., Philadelphia, Pa.

PASSAIC Steel Co., Paterson, N. J.

PENNSYLVANIA Steel Co., Girard Trust Bldg., Philadelphia, Pa.

PHOENIX Iron Co., 410 Walnut St., Philadelphia, Pa.

REPUBLIC Iron & Steel Co., Frick Bldg. Annex, Pittsburg, Pa.

BAR IRON OR STEEL

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

BRAEBURN Steel Co., Braeburn, Pa.

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

COLUMBIA Steel & Shafting Co., Pittsburg, Pa.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

INLAND Steel Co., 1st National Bank Bldg., Chicago, Ill.

JONES & Laughlin's Steel Co., Pittsburg, Pa.

LOCKHART Iron & Steel Co., McKees Rocks, Pa.

LOGAN Iron & Steel Co., Harrison Bldg., Philadelphia, Pa.

PARDEE Works, C., Perth Amboy, N. J.

PASSAIC Steel Co., Paterson, N. J.

PENNSYLVANIA Steel Co., Girard Trust Bldg., Philadelphia, Pa.

PHILADELPHIA Forge Co., 50 Church St., New York, N. Y.

PHOENIX Iron Co., 410 Walnut St., Philadelphia, Pa.

REPUBLIC Iron & Steel Co., Frick Bldg. Annex, Pittsburg, Pa.

SWEET'S Steel Co., Williamsport, Pa.

SHEET STEEL

AMERICAN Sheet & Tin Plate Co., Frick Bldg., Pittsburg, Pa.

AMERICAN Steel & Wire Co., The Rookery, Chicago, Ill.

CARNAHAN Tin Plate & Sheet Co., Canton, O.

FOLLANSBEE Bros. Co., Third & Liberty Aves., Pittsburg, Pa.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

PARKERSBURG Iron & Steel Co., Parkersburg, W. Va.

McCULLOUGH Iron Co., Wilmington, Del.

TAYLOR Co., N. & G., 308 Chestnut St., Philadelphia, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

COLD ROLLED BAR STEEL

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn. (See page 225.)

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

COLUMBIA Steel & Shafting Co., Pittsburg, Pa.

COMPRESSED Steel Shafting Works, 393 Dorchester Ave., Boston, Mass.

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

CUMBERLAND Steel Co., Williams St. & B. & O. R. R., Cumberland, Md.

JONES & Laughlin's Steel Co., Pittsburg, Pa.

PARDEE Works, C., Perth Amboy, N. J.

UNION Drawn Steel Co., Beaver Falls, Pa.

COLD ROLLED STRIP STEEL

AMERICAN Steel & Wire Co., The Rookery, Chicago, Ill.

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn. (See page 225.)

CARPENTER Steel Co., Reading, Pa.

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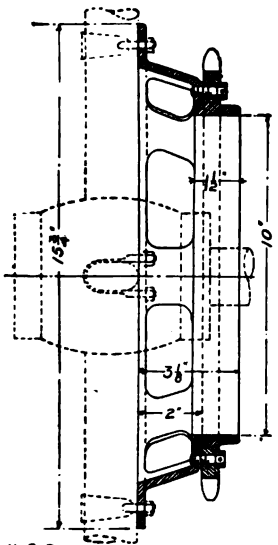
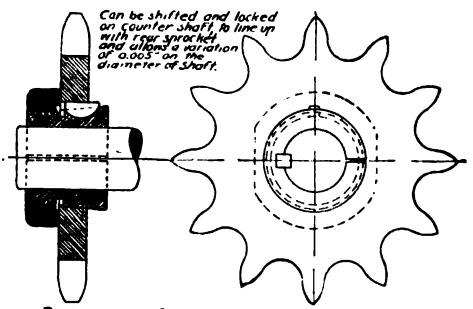
CULLMAN SPROCKETS



No. 2. Rear Wheel Sprocket & Brake Drum. Patented. Cullman Wheel Co. Chicago, Ills.

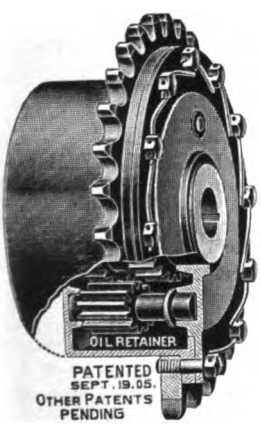


Detachable Counter Shaft Sprocket. Patent Applied For. Cullman Wheel Co. Chicago, Ills.

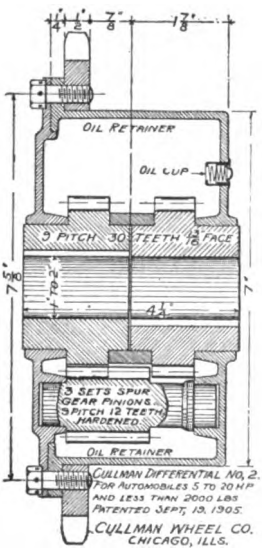
and DIFFERENTIALS

In stock and to order; also Baldwin, Diamond and Whitney Chains

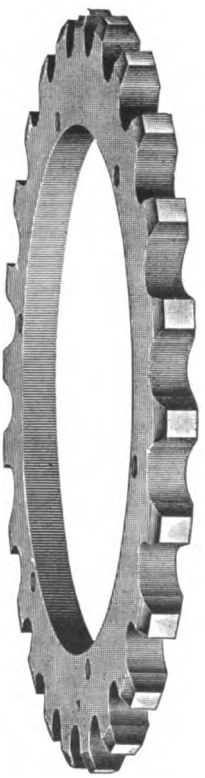
Send for Complete Catalog



PATENTED SEPT. 19. 05. OTHER PATENTS PENDING



Cullman Differential No. 2. For Automobiles 5 to 20 H.P. and less than 2000 lbs. Patented Sept. 19. 1905. Cullman Wheel Co. Chicago, Ills.



CULLMAN WHEEL COMPANY

1020 GREENWOOD TERRACE - - - CHICAGO, ILLINOIS

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STEEL (Continued)

COLD ROLLED STRIP STEEL (Continued)

COLUMBIA Steel Co., Elyria, O.

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

ELLIOTT-BLAIR Steel Co., Taylor & Newcastle Sts., Newcastle, Pa.

STANLEY Works, Lake St., New Britain, Conn.

SUPERIOR Steel Co., Carnegie, Pa.

TOOL STEEL

ALLENS—See Kent & Co.

ATLAS Steel Co., Dunkirk, N. Y.

BALDWIN Steel Co., 133 Reade St., New York, N. Y.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

BRAEBURN Steel Co., Braeburn, Pa.

BROWN & Co., 10th St. & Duquesne Way, Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa. "Comet."

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

COMET—See Carpenter Steel Co.

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

CYCLOPS Steel Works, Titusville, Pa.

DAMASCUS Nickel Steel Co., Carnegie, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

HALCOMB Steel Co., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

KENT & Co., Edwin R., 282 Pearl St., New York, N. Y. (Importers). "Allens."

LUDLOW Steel & Spring Co., Pompton, N. J.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

NEW Brighton Steel Co., New Brighton, Pa.

NORWALK Iron & Steel Co., Norwalk, O.

PHILADELPHIA Forge Co., 50 Church St., New York, N. Y.

PITTSBURGH Tool Steel Wire Co., Monaca, Pa.

SCHUCHARDT & Schutte, West Street Bldg., New York, N. Y. (Importers). (See page 347.)

VULCAN Crucible Steel Co., Aliquippa, Pa.

SPRING STEEL

AMERICAN Steel & Wire Co., The Rookery, Chicago, Ill.

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn. (See page 225.)

BRAEBURN Steel Co., Braeburn, Pa.

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

COLUMBIA Steel Co., Elyria, O.

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

PENNSYLVANIA Steel Co., Girard Bldg. Philadelphia, Pa.

PHILADELPHIA Forge Co., 50 Church St., New York, N. Y.

SWEET'S Steel Co., Williamsport, Pa.

MANGANESE STEEL

ALLENS—See Kent & Co.

KENT & Co., Edwin R., 282 Pearl St., New York, N. Y. (Importers) "Allens."

UNITED Steel Co., Canton, O.

NICKEL STEEL

BALDWIN Steel Co., 133 Reade St., New York, N. Y.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

BOKER & Co., Herman, 101 Duane St., New York, N. Y. (Importers).

CARBON Steel Co., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa.

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

DAMASCUS Nickel Steel Co., Carnegie, Pa.

HALCOMB Steel Co., Syracuse, N. Y.

MIDVALE Steel Co., Nicetown, Philadelphia Pa.

PHILADELPHIA Forge Co., 50 Church St. New York, N. Y.

CHROME NICKEL STEEL

BALDWIN Steel Co., 133 Reade St., New York, N. Y.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

CARPENTER Steel Co., Reading, Pa.

COLUMBIA Steel Co., Elyria, O.

CROWLEY & Co., John A., 120 Liberty St., New York, N. Y. (Importers). "Krefeld."

HALCOMB Steel Co., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

ILLINGSWORTH Steel Co., John, Frankford Philadelphia, Pa.

KREFELD—See Crowley & Co.

KRUPP—See Prosser & Sons.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

PHILADELPHIA Forge Co., 50 Church St. New York, N. Y.

Complete Index to Classification appears on Pages 7 to 15.

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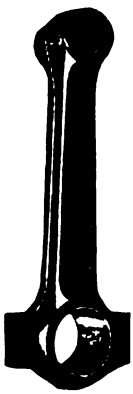
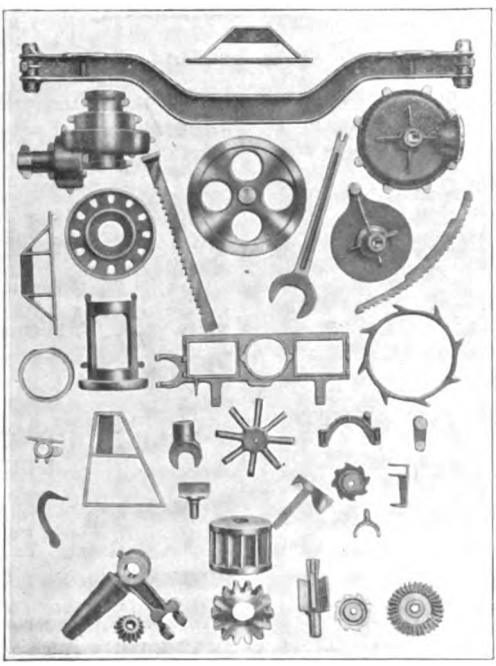
VANADIUM CRUCIBLE STEEL CASTINGS

FOR ALL PURPOSES



I-BEAM SECTION
ROUGH

H SECTION
FINISHED



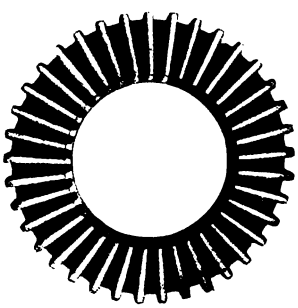
TWO THROW
FINISHED

SINGLE THROW
ROUGH

Send for Booklet

on

VANADIUM STEEL



NEW PROCESS STEEL COMPANY,

Desk A

Marshall, Mich.

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STEEL (Continued)

CHROME NICKEL STEEL (Continued)

PROSSER & Sons, Thos., 15 Gold St., New York, N. Y. (Importers). "Krupp."

ROYAL Metal Steel Co., 24 State St., New York, N. Y. (Importers).

SCHUCHARDT & Schutte, West Street Bldg., New York, N. Y. (Importers). (See page 347.)

SIER-BATH Co., 145 W. 54th St., New York, N. Y. (Importers). (See page 127.)

UNITED Steel Co., Canton, O.

VANADIUM STEEL

BALDWIN Steel Co., 133 Reade St., New York, N. Y.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa.

COLONIAL Steel Co., Keystone Bldg., Pitts-

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

EHRENZELLER, G. F., Pennsylvania Bldg. Philadelphia, Pa. (Importers).

HALCOMB Steel Co., Syracuse, N. Y.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

PENNSYLVANIA Steel Co., Girard Trust Bldg., Philadelphia, Pa.

UNITED Steel Co., Canton, O.

ALUMINUM COATED SHEET STEEL

ALUMALOYD—See Stark Rolling Mill Co.

AMERICAN Aluminum Coating Co., Connellsville, Pa.

STARK Rolling Mill Co., Canton, O. "Alumaloyd." (See page opposite.)

COPPER-CLAD STEEL

DUPLEX Metals Co., 208 Fifth Ave., New York, N. Y.

HIGH-SPEED CUTTING STEEL

ALBION—See Hobson, Houghton & Co.

ALLENS—See Kent & Co.

ATLAS Steel Co., Dunkirk, N. Y. "Loco."

BALDWIN Steel Co., 133 Reade St., New York, N. Y. "Hudson."

BLUE CHIP—See Wheelock, Lovejoy & Co.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

CAPITAL—See Nash & Co.

CARPENTER Steel Co., Reading, Pa. "Zenith."

EXCELSIOR—See Royal Metal Steel Co.

FRASSE & Co., Peter A., 92 Fulton St., New York, N. Y. (Importers). "Poldi."

HALCOMB Steel Co., Syracuse, N. Y. "Saben."

HELLER Bros. Co., Newark, N. J.

HOBSON, Houghton & Co., 19 Cliff St., New York, N. Y. (Importers). "Albion."

HUDSON—See Baldwin Steel Co.

INTERNATIONAL High Speed Steel Co., Franklin Square, New York, N. Y.

JESSOP & Sons, Wm., 19 John St., New York, N. Y. (Importers).

JONES & Co., B. M., 141 Milk St., Boston, Mass. (Importers). "Mushet."

KENT & Co., Edwin R., 282 Pearl St., New York, N. Y. (Importers). "Allens."

LOCO—See Atlas Steel Co.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

MUSHET—See Jones & Co.

NASH & Co., Geo., 224 Pearl St., New York, N. Y. (Importers). "Capital."

PHILLIPS & Sons Co., F. R., Penn Bldg., Philadelphia, Pa. "Velos."

POLDI—See Frasse & Co.

ROYAL Metal Steel Co., 24 State St., New York, N. Y. (Importers). "Excelsior."

SABEN—See Halcomb Steel Co.

SCHUCHARDT & Schutte, West Street Bldg., New York, N. Y. (Importers). (See page 347.)

VELOS—See Phillips & Sons Co.

VULCAN Crucible Steel Co., Aliquippa, Pa.

WARDLOW, S. & C., 95 John St., New York, N. Y. (Importers).

WHEELOCK, Lovejoy & Co., 23 Cliff St., New York, N. Y. (Importers). "Blue Chip."

ZENITH—See Carpenter Steel Co.

SELF-HARDENING CUTTING STEEL

COLUMBIA Steel Co., Chicago Heights, Ill.

CRUCIBLE Steel Co. of America, Frick Bldg., Pittsburg, Pa.

FIRTH-Sterling Steel Co., Pittsburg, Pa.

HOBSON, Houghton & Co., 19 Cliff St., New York, N. Y. (Importers).

HOUGHTON & Richards, 150 Oliver St., Boston, Mass.

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

JESSOP & Sons, Wm., 19 John St., New York, N. Y. (Importers).

JONES & Co., B. M., 141 Milk St., Boston, Mass.

McINNES Steel Co., Corry, Pa.

VULCAN Crucible Steel Co., Aliquippa, Pa.

STEPS

FORGED STEPS

(See Forgings, Drop)

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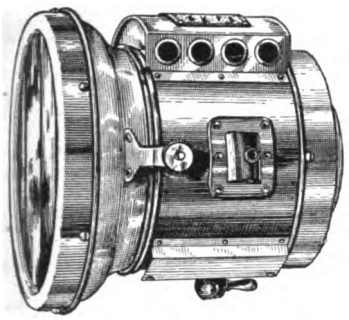

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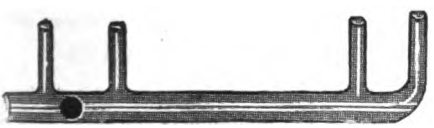
Manufacturer of

COPPER INLET and EXHAUST PIPES



Finished in the most approved up-to-date manner. Estimates furnished on receipt of blue prints.

Special rates on quantities

For Automobile Bodies, Dashes, Guards, Bonnets, Battery Boxes, Drip Pans, Mufflers, Etc.

STRONG—DURABLE SCALELESS—RUSTLESS—SMOOTH—PAINT ADHERES FIRMLY.

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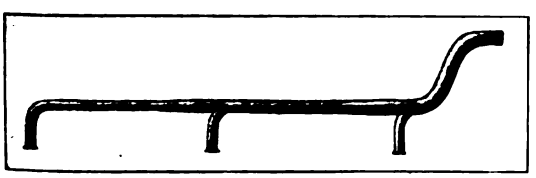
MANIFOLDS tapered and bent to any possible design of one piece seamless tube for Gas Intake, Exhaust, Water Inlets and Outlets, etc. Send us your blue prints and quantity requirements or prices. Autogenous welding.



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If you have difficult metal work that bothers you try us.

Ask for sample and table of standard sizes of the simplest and best Cylinder and Manifold connection, the PAT. DIVPLUG.

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STEPS (Continued)

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DAHLSTROM Metallic Door Co., Buffalo St. & Blackstone Ave., Jamestown, N. Y. "Diamond."

DIAMOND—See Dahlstrom Metallic Door Co.

ENGLISH & Mersick Co., New Haven, Conn.

Q & C STANWOOD—See Quincy-Manchester-Sargeant Co.

QUINCY-MANCHESTER-SARGEANT Co., Plainfield, N. J. "Q & C Stanwood." (See page 377.)

STAMPED AND PRESSED STEPS

(See Stampings, Steel)

STONES

OIL STONES

(For cleaning platinum points on Spark Plugs)

PIKE Mfg. Co., Pike, N. H.

STRAINERS

GASOLINE STRAINERS OR SEPARATORS

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ACORN—See Clark, E. P.

AUTO Novelty & Supply Co., 181 Mathewson St., Providence, R. I.

BOSS—See Jones, Wm. S.

BREEZE Carbureter Co., 276 Halsey St., Newark, N. J.

CENTRAL Brass & Fixture Co., 118 W. North St., Springfield, O. "Puritan."

CENTURY Specialty Co., 1079 S. Bruck St., Columbus, O.

CLARK, E. P., Arcade, Utica, N. Y. "Acorn."

FLENTJE, Ernst, 1643 Cambridge St., Cambridge, Mass.

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

JONES, Wm. S., Drexel Bldg., Philadelphia, Pa. "Boss."

KAUFMANN, Chas., 28 Main St., Oshkosh, Wis.

KINSEY Mfg. Co., Dayton, O. (See page 143.)

KRAMER, William H., 244 Van Alst Ave., Long Island City, N. Y.

LEAVITT—See Uncas Specialty Co.

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J. (See page 115.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

MARTIN—See Turner Brass Works.

NATIONAL Stamping & Electric Works, 153-59 S. Jefferson St., Chicago, Ill. (See page 375.)

NO-KLOG—See Standard Gasoline Filter Co.

NORWALL Mfg. Co., Chicago, Ill.

PURITAN—See Central Brass & Fixture Co.

SCHAAL, W. R., 27 N. Jefferson St., Chicago, Ill. "Simplex."

SIMPLEX—See Schaal, W. R.

STANDARD Gasoline Filter Co., Attleboro, Mass. "No-Klog."

TURNER Brass Works, Sycamore, Ill. "Martin."

UNCAS Specialty Co., 25 Shipping St., Norwich, Conn. "Leavitt."

WHEELER & Schebler, Shelby & Sanders Sts., Indianapolis, Ind.

STRAPS

ANTI-RATTLING HOOD STRAPS

HARTFORD Rubber Works Co., Hartford Conn.

SPRING Strap Co., 3 Huron St., Chicago, Ill. (See page 41.)

LEATHER TOP STRAPS

CARTER Co., Geo. R., Connersville, Ind.

DECKER, J. C., Montgomery, Pa.

GRATON & Knight Mfg. Co., 94-104 Bloomingdale Rd., Worcester, Mass. (See page 271.)

HOLLIDAY - WYON Co., Indianapolis, Ind. (See page 497.)

STEVENS Co., Chas. L., 139 Beaubien St., Detroit, Mich.

WINSHIP, W. W., 71 Summer St., Boston Mass.

STARTING CRANK STRAPS

(See Holders, Starting Crank)

SUPPLIES

DEALERS IN SUPPLIES

(This is a list of Dealers and Jobbers in Automobile Supplies who advertise in this publication)

AKRON Auto Supply Co., 391 Main St., Akron, O. (See page 509.)

AUTO Accessories Mfg. Co., Detroit, Mich. (See Page 237.)

Complete Index to Classification appears on Pages 7 to 18.

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PERMANIT"

The ADOLF KARL CO., Inc.
SOLE MANUFACTURERS
NEWARK, N. J.

To DEALERS.

Mr. Dealer: Do you want the best proposition in the automobile field? If so, get in touch with us at once. A little exclusive territory is open for the right man

Heals all punctures instantly while wheels are revolving

Wonderful but true

NOT a tire filler, but simply a little powder injected in inner tube through valve, once a year or two

Increases the life of the rubber and if it injures the tire we will give the owner of car a NEW tire f. o. b., wherever he is

SEND 53 CENTS FOR SAMPLE CARTON, WHICH IS SUFFICIENT FOR A BICYCLE TIRE

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Many prospective buyers of automobiles hesitate to buy because of tire troubles; you know this. You can guarantee puncture-proof any tire, we don't care what make, if you place about 8 oz. of "PERMANIT" in the tire before delivering the car.

Put it in your demonstrating car and prove it yourself as well as for customers

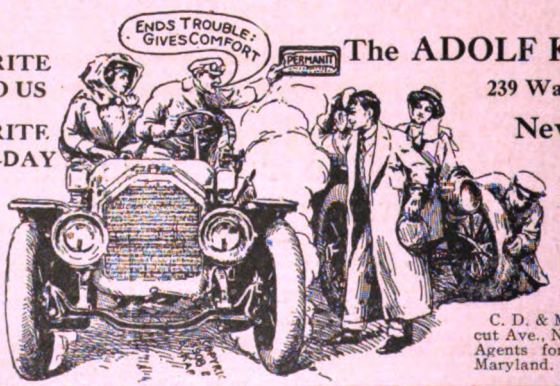
Our guarantee backs this up and applies to both you and your customer

TO TIRE MANUFACTURERS:

Read this and other side of page and you'll find there is something in it for you. It may lessen the output of your tires temporarily, but you will get the reputation for making a tire that won't puncture and shortly double your business.

WRITE TO US

WRITE TO-DAY



The ADOLF KARL CO., Inc.
239 Washington Street
Newark, N. J.

Dr. J. W. Tuckett, Geneva, Neb., Agency for Nebraska, Kansas and Colorado.

Legnard Bros., Waukegan, Ill., Agents for Illinios.

H. Craig Chapman, Birmingham, Ala., Agent for Alabama and Georgia.

C. D. & M. L. Jacobson, 1028 Connecticut Ave., N. W., Washington, D. C., Sole Agents for District of Columbia and Maryland.

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Upholstering, Tops, Fenders, etc.

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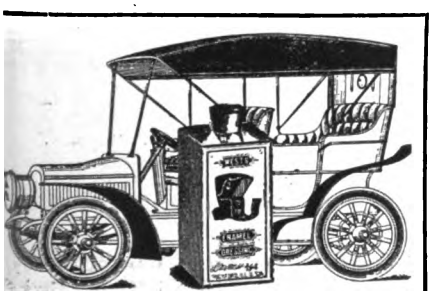
Clutches
Steering Gears
Universal Joints
Wind Shields
Tops, Etc.

JOHNSON SERVICE CO.
Milwaukee, Wis.

WEST'S AUTOMOBILE TOP DRESSING



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Absolutely Preserves the Top Permanently
Much as the material would last in a good dry loft

GIVES A FINISH LIKE A NEW TOP

There is nothing equals it
Send for Quotations and Sample on Paper
that you can roll or crumple but cannot crack until the surface beneath it gives way and breaks it
Will Never Get Brittle nor Crackle

MANUFACTURED ONLY BY
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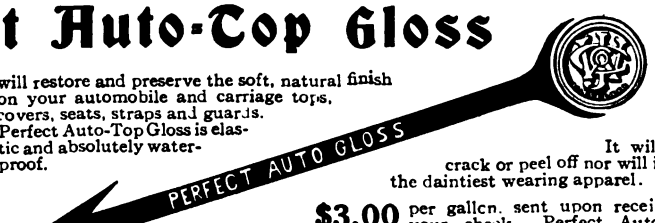
ROCKFORD, ILLINOIS

Perfect Auto-Top Gloss

will restore and preserve the soft, natural finish on your automobile and carriage tops, covers, seats, straps and guards. Perfect Auto-Top Gloss is elastic and absolutely waterproof.



It will not crack or peel off nor will it soil the daintiest wearing apparel.

$3.00 per gallon, sent upon receipt of your check. Perfect Auto-Top Gloss is the only guaranteed dressing for leather, pantasote and rubber. Trial sample sent upon receipt of 10 cents to cover cost of mailing.

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SUPPLIES (Continued)

DEALERS IN SUPPLIES (Continued)

AUTOLIGHT & Motor Supply Co., 506 N. Broad St., Philadelphia, Pa.
(See page 45.)

AUTOMOBILE Supply Co., 1331 Michigan Ave., Chicago, Ill.
(See page 155.)

BECKLEY-RALSTON Co., 80-84 Michigan Ave., Chicago, Ill.
(See page 267.)

BEHEN-FAUGHT Motor Car Equipment Co., 3961 Olive St., St. Louis, Mo.
(See page opposite.)

BI-MOTOR Equipment Co. (The S-M Supplies Co.), 177 Portland St., Boston, Mass.
(See page 415.)

BUICK Co., Thos. D., 715 S. Saginaw St., Flint, Mich.
(See page 125.)

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill.
(See page 489.)

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass.
(See page 437.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y.
(See page 179.)

MOTOR Car Supply Co., 1425-27 Michigan Ave., Chicago, Ill.
(See page 465.)

NEUSTADT Auto & Supply Co., Olive St., St. Louis, Mo.
(See page 509.)

PHOENIX Auto Supply Co., 3932 Olive St., St. Louis, Mo.
(See page 155.)

POST & Lester Co., Hartford, Conn.
(See page 41.)

STRANG Supply Co., Lewis, 1912 Broadway, New York, N. Y.
(See page 497.)

WAITE Auto Supply Co., 17 Dorrance St., Providence, R. I.
(See page opposite.)

SWITCHES

AUTOMATIC TIME SWITCHES

(For automatically turning the current on or off when charging storage batteries)

ABBOTT, Eugene B., Painesville, O.

BISSELL Co., F., 226 Huron St., Toledo, O. "Security."

CAMPBELL Electric Co., Lynn, Mass.

CRESCENT Co., Valparaiso, Ind.

DORLAND, Leslie C., Poughkeepsie, N. Y.

ELECTRIC Motor & Equipment Co., 13-15 Beaver St., Newark, N. J.

ELECTRIC Time Switch Co., New York, N. Y.

GENERAL Electric Co., Schenectady, N. Y.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.

REDDING & Co., Jerome, Boston, Mass.

SECURITY—See Bissell Co.

SORENSEN, P., 18 Dunham Pl., Brooklyn, N. Y.

ELECTRIC SWITCHES

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 49.)

B. & J. Mfg. Co., 3985 Cottage Grove Ave., Chicago, Ill.

CONNECTICUT Telephone & Electric Co., 45 Britannia St., Meriden, Conn.
(See page 101.)

COUCH Co., S. H., 156 Purchase St., Boston, Mass. "Puritan."
(See page 503.)

COWLES & Co., C., New Haven, Conn.
(See page 143.)

DAYTON Electrical Mfg. Co., 32 N. St. Clair St., Dayton, O.

DOW Portable Electric Co., Adams St., Braintree, Mass.

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y.

EISNER—See Gordon Auto Supply Co.

ELDREDGE Electric Mfg. Co., 7 Post Office Square, Springfield, Mass.

EMPIRE Electric Mfg. Co., Plainville, Conn.

FAULTLESS—See Motsinger Device Mfg. Co.

GOODSON Electric & Mfg. Co., Providence, R. I.
(See page 101.)

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass. "Eisner."
(See page 437.)

HERZ & Co., Lafayette & Houston Sts., New York, N. Y.
(See yellow insert.)

HIGH Frequency Ignition Coil Co., 2309 S. Main St., Los Angeles, Cal. "Seeley."

IDEAL Switch Co., Plainville, Conn.
(See page 443.)

KENT Mfg. Works, Atwater, 44 N. Sixth St., Philadelphia, Pa.
(See page 443.)

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., High St. & L. S. & M. S. Ry., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., Kokomo, Ind. "Kingston."
(See page 469.)

MOTSINGER Device Mfg. Co., 36 Main St., Pendleton, Ind. "Faultless."

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 95.)

PURITAN—See Couch Co.

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

RAPID FIRE—See Tritt Electric Co.

REMY Electric Co., Anderson, Ind.
(See page 417.)

SEELEY—See High Frequency Ignition Coil Co.

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y.
(See page 433.)

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Jobbers—Dealers
Behen-Faught Motor Car Equipment Co.
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SWITCHES (Continued)

ELECTRIC SWITCHES

(Continued)

TRITT Electric Co., 301 S. Division St., Union City, Ind. "Rapid Fire."

WICO—See Witherbee Igniter Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico." (See page 205.)

ELECTRIC LOCK SWITCHES

AUTO Lock Co., 6546 Minerva Ave., Chicago, Ill.

AUTO-LOCK Plug Co., 31 Nassau St., New York, N. Y.

BIRD—See Motor Specialty Mfg. Co.

GOEBEL, F. A., Marietta, O. "Snapit."

JACOBSON-BRANDOW Co., 86 North St., Pittsfield, Mass.

MOTOR Specialty Mfg. Co., 105 Washington St., Chicago, Ill. "Bird."

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 95.)

SAFETY Device Co., Indianapolis, Ind. (See page 399.)

SAFETY Lock Switch Co., 319 Caxton Bldg., Cleveland, O.

STANDARD Auto Supply & Mfg. Co., 20 Broad St., N. Y. City.

FOOT SWITCHES

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. (See yellow insert.)

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico." (See page 205.)

STEERING WHEEL SWITCHES

CONNECTICUT Telephone & Electric Co., 45 Britannia St., Meriden, Conn. (See page 101.)

SYSTEMS

ACCOUNTING AND COST SYSTEMS

BROOKS, Jr., & Co., Henry W., 15 Wall St., New York, N. Y. (See page 37.)

GASOLINE LIGHTING SYSTEMS

(For lighting garages)

SUN Vapor Light Co., 244 Market St., Canton, O. (See page 307.)

TACKS

UPHOLSTERY TACKS

CLEVELAND Tack Works, Cleveland, O.

COBB & Drew, Plymouth, Mass.

EAGLE—See Turner & Seymour Mfg. Co.

GENESEE Tack Co., 35-57 Mt. Hope Av Rochester, N. Y.

GRAND Crossing Tack Co., Grand Crossin Chicago, Ill.

HIGGIN Mfg. Co., Newport, Ky.

MILWAUKEE Tack Co., Layton Park, M waukee, Wis.

NEW Haven Button Co., 161 Brewery S New Haven, Conn.

PLYMOUTH Mills, Plymouth, Mass.

RIPLEY & Bartlett, Water St., Plymou Mass.

SALMOND & Son, Sam, Hanover, Mass.

SHELTON Co., Shelton, Conn.

TOCKWOTTON Co., 79 S. Main St., Pro dence, R. I.

TOWER Mfg. Co., Madison, Ind.

TURNER & Seymour Mfg. Co., Torringt Conn. "Eagle."

WATERMAN, R. C., Hanover, Mass.

TALC

TIRE TALC

AMERICAN Talc Co., 22-24 Custom Ho St., Boston, Mass. "Imperial."

BINNEY & Smith Co., 81 Fulton St., York, N. Y. "Tyreze."

DOGGETT, Stanley, 101 Beekman St., York, N. Y.

IMPERIAL—See American Talc Co.

NEVINS Co., Samuel, Philadelphia, Pa.

NORTH Carolina Talc & Mining Co., Hew N. C.

SALOMON & Bro., L. A., New York, N.

STEWARD Mfg. Co., D. M., Chattano Tenn.

TYREZE—See Binney & Smith Co.

WHITTAKER, W. H., 245 Front St., York, N. Y.

WILLIAMS & Co., C. K., Easton, Pa.

TANKS

ACETYLENE TANKS

ACETYLENE Special Co., 405 Broome New York, N. Y. "Stero-Light."

AUTOGAS—See Avery Portable Lighting

AVERY Portable Lighting Co., State Martin Sts., Milwaukee, Wis. "Au gas." (See page opposite.)

PURITAN Gas Tank Co., 45 Milk Boston, Mass. (See page opposite.)

PREST-O-LITE Co., Indianapolis, Ind.

STERO-LIGHT—See Acetylene Specialty

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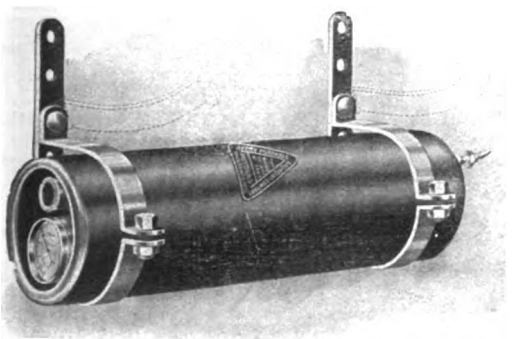
AUTOGAS



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51 West 63d Street, New York City. 1038 South Main Street, Los Angeles, Cal.

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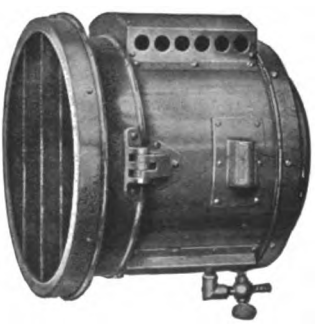
Rushmore Searchlight

is not due to advertising, but to workmanlike and optically correct construction. You can test its quality in a moment, by placing it beside any other make of lamp at night, and by noting the weight of material and how it is put together.



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PLAINFIELD, NEW JERSEY

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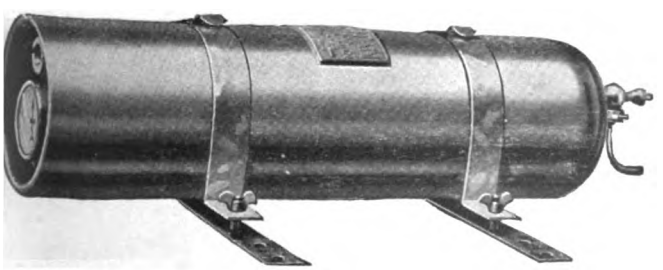

PURITAN TANKS

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Factory: Canton, Mass.

AGENCIES: Boston, New York, Philadelphia, Pittsburg, St. Louis, Chicago, Cleveland, Hartford, &c.

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TANKS (Continued)

FUEL AND WATER TANKS

A. H. & S. Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

AMERICAN Safety Appliance Co., 210 Center St., New York, N. Y. (Non-Explosive.) (See page 361.)

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill. (See page 109.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 100.)

BUSH Mfg. Co., 79 Commerce St., Hartford, Conn. (See page 197.)

CLAYTON'S Sons, Frank B., 1222-24 Race St., Philadelphia, Pa.

DETROIT Auto Specialty Co., 910 Greenwood Ave., Detroit, Mich.

FEDDERS Mfg. Works, Buffalo, N. Y. (See page 485.)

FOLSOM Mfg. Co., C. G., 545 Scott St., South Bend, Ind.

FREELAND Sons Co., B. F., Sturgis, Mich.

GETCHELL & Son, S. S., Woonsocket, R. I.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See page 455.)

ILLINOIS Heater & Mfg. Co., 3947 Wentworth Ave., Chicago, Ill.

IRONCLAD Mfg. Co., 204 Varet St., Brooklyn, N. Y.

JANNEY, Steinmetz & Co., Fourth & Market Sts., Philadelphia, Pa.

KELLS Mfg. Co., W. J., 62-66 Van Winkle Ave., Jersey City, N. J. (See page 147.)

KINSEY Mfg. Co., Dayton, O. (See page 143.)

KOVEN & Brother, L. O., 50 Cliff St., New York, N. Y. (See page opposite.)

MANUFACTURERS' Can Co., 434 Mulberry St., Newark, N. J.

MULLINS Co., W. H., 124 Franklin St., Salem, O.

NORTHMANN-DUFFKE Foundry Co., 26th & Layton Aves., Milwaukee, Wis.

OFF & Co., Christian, 5 N. New Jersey St., Indianapolis, Ind.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

PRESSED Steel Tank Co., West Allis, Wis.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y. (See page 147.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

STANDARD Welding Co., Cleveland, O. (See page opposite.)

TRAGESER Steam Copper Works, John, 46 57 W. 26th St., New York, N. Y.

WESTERN Drop Forge Co., Marion Ind. (See page 317.)

WILSON-WELLMAN Mfg. Co., 1444 E. 49 St., Cleveland, O.

WRIGHT Cooler & Hood Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

GASOLINE STORAGE TANKS AN SYSTEMS

ACME—See Wilson & Friend Co.

AIR-TIGHT Steel Tank Co., Gloster S Pittsburg, Pa.

AMERICAN Safety Appliance Co., 2 Centre St., New York, N. Y. (Non-E plosive.) (See page 361.)

ARCHER Tank Co., 76 West St., Rutlan Vt.

BEATTIE & Co., Ernest, 1622 Wabash Av Chicago, Ill.

BEMAN Automatic Oil Can Co., Meadvil Pa.

BOWSER & Co., S. F., Ft. Wayne, Ind.

BOYER-RADFORD & Gordon Tank & Pu Co., Ice Ave., Dayton, O. "Dayton."

BROWN Oil Can Co., Dawson St., Toledo,

CLEVELAND Wire Spring Co., Ham ton Ave. & E. 38th St., Cleveland, O (See page 419.)

DAYTON—See Boyer-Radford & Gor Tank & Pump Co.

DELPHOS Mfg. Co., Delphos, O.

EASTERN Oil Tank Co., 136 Fletcher Lowell, Mass.

FREELAND Sons Co., B. F., Sturgis, Mi "Pioneer."

GETCHELL & Son, S. S., Woonsocket, R

GILBERT & Barker Mfg. Co., Springfie Mass. "Springfield."

HYDRAULIC Oil Storage Co., 820 Penobs Bldg., Detroit, Mich. "Snells."

IDEAL Tank Works, Park Ave. & Lind St., Meadville, Pa.

IRONCLAD Mfg. Co., 204 Varet St., Broo lyn, N. Y.

KALTENBACH, Fred, 234 Washington Bl Chicago, Ill.

KOVEN & Bro., L. O., 50 Cliff St., Ne York, N. Y. (See page opposite.)

NATIONAL Oil Pump & Tank Co., 411-13 First St., Dayton, O.

NEIL & Co., Wm., 216 E. Division St., Ch cago, Ill.

NORWICH Storage Tank Co., 19 Mechan St., Norwich, N. Y.

PIONEER—See Freeland Sons Co.

SNELLS—See Hydraulic Oil Storage Co.

SPRINGFIELD—See Gilbert & Barker M Co.

STOUTENBOROUGH, X., 277 Pearl St., R. I.

SYPHONIC Measure Tank Co., Sheboyg Wis.

TIRRILL Gas Machine Lighting Co., 75 F ton St., N. Y. City.

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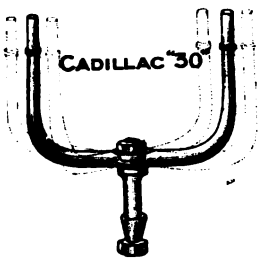
Rochester Adjustable Brackets

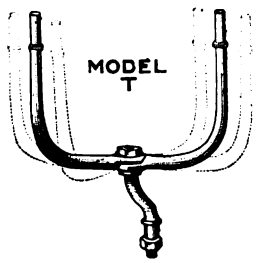


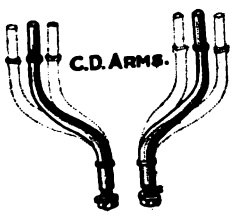
Cadillac 30 Adjustable Bracket

Specially designed for this car. Will fit into sockets already on the frame. High enough so lamp will not interfere with tire of wheel or starting crank.. Adjustable for width from 6½ to 9¼ inches.

Ford T Adjustable Bracket

Realizing a demand that will surely occur for owners of this car to want larger lamps than could be used on the brackets regularly supplied, we have designed this adjustable bracket that will fit into socket that the factory's bracket fits into. It is particularly light, but has ample strength and puts the lamp up higher and out of the way of starting crank. Adjustable from 6½ to 9 inches.





Chalmers Detroit Arms

These arms are made especially to fit this model car. Will fit into socket already attached to frame. The finish of this is smooth and bright and is a turned arm instead of a rough forging and when plated looks extremely neat and natty.

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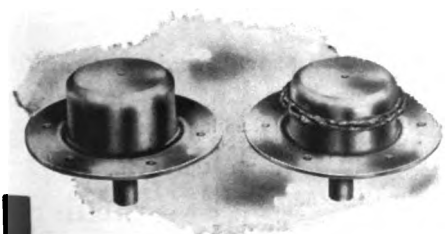

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TANKS (Continued)

GASOLINE STORAGE TANKS AND STYSTEMS (Continued)

TOKHEIM Mfg. Co., Burlington, Iowa.

WALLMAN Mfg. Co., 283-87 Fifth Ave., Milwaukee, Wis.

WAYNE Oil Tank & Pump Co., Ft. Wayne, Ind.

WESTERN Oil Pump Co., 2447 Kosciusko St., St. Louis, Mo.

WILSON & Co., F. Cortez, 247 Lake St., Chicago, Ill.

WILSON & Friend Co., 200 E. Kinzie St., Chicago, Ill. "Acme."

TIRE INFLATING TANKS

AUTO Tire Inflating Co., 104 S. Eighth St., Brooklyn, N. Y. "Wyman."

AVERY Portable Lighting Co., State & Martin Sts., Milwaukee, Wis. (See page 261.)

BASTIAN Mfg. Co., Chas. L., 76 Illinois St., Chicago, Ill.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

EMANCIPATOR—See Liquid Carbonic Co.

LENNOX Chemical Co., 1201 E. 55th St., Cleveland, O.

LIQUID Carbonic Co., 67 Wells St., Chicago, Ill. "Emancipator."

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

PREST-O-LITE Co., Indianapolis, Ind.

STANDARD Carbonic Co., Sixth & Burns Sts., Cincinnati, O.

UNIVERSAL—See New York Coach & Auto Lamp Co.

WYMAN—See Auto Tire Inflating Co.

TIRE TESTING TANKS

EDWARDS, J. H., 59 Park Pl., New York, N. Y.

TAPE

INSULATING TAPE

AMERICAN Electrical Works, Providence, R. I.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BRIXEY, W. R., 203 Broadway, New York, N. Y.

CLIFTON Mfg. Co., Jamaica Plain, Boston, Mass.

CONTINENTAL Rubber Works, 19th & Liberty St., Erie, Pa.

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

NATIONAL India Rubber Co., Bristol, R. I.

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y.

WALPOLE Rubber Works, Walpole, Mass. (See page 177.)

TAXIMETERS

DIEN, Ch., 43-45 W. 34th St., New York, N. Y. (Importer.)

FRANCO-AMERICAN Taximeter Co., 112-14 W. 42d St., New York, N. Y. Importers). "Richard-Popp."

INTERNATIONAL Taximeter Co., 25 Broad St., New York, N. Y. (Importers).

JONES Speedometer Co., New Rochelle, N. Y.

RICHARD - POPP — See Franco - American Taximeter Co.

ROYAL Taximeter Co., 149 Fifth Ave., New York, N. Y.

SMITH & Sons, S., 116 Broad St., New York, N. Y. (Importers).

WESTCHESTER Appliance Co., Ludlow Station, Yonkers, N. Y.

TEES

PIPE TEES

(See Fittings, Pipe)

TERMINALS

WIRE TERMINALS

B. & B. Co 1[illegible] Rockview Ave., Plainfield, N. J.

BARCY & Nicholson, 367 Howard St., Detroit, Mich.

BLISS-CHESTER Co., 31 Mathewson St., Providence, R. I. "Duplex."

BRIGGS, W. H., 329 Chestnut St., Richmond Hill, N. Y.

CONNECTICUT Telephone Electric Co., 45 Britannia St., Meriden, Conn. (See page 101.)

DUPLEX—See Bliss-Chester Co

GOODSON Electric & Mfg. Co., Providence, R. I. (See page 101.)

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. (See yellow insert.)

LOMBARDI Motor Co., Derby, Conn.

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y. (See page 203.)

NEVER-MISS Spark Plug Co., Lansing, Mich. (See page 101.)

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 95.)

RAJAH Auto Supply Co., Watsessing Station, Bloomfield, N. J. (See page 449.)

SHAIN, Chas D., 70 Murray St., New York, N. Y. (See page opposite.)

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 433.)

Complete Index to Classification appears on Pages 7 to 18.

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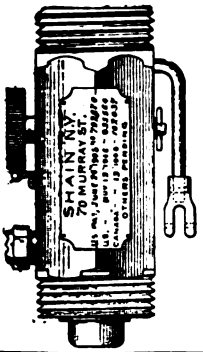

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Popular Model B

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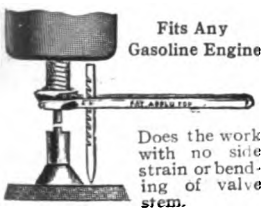

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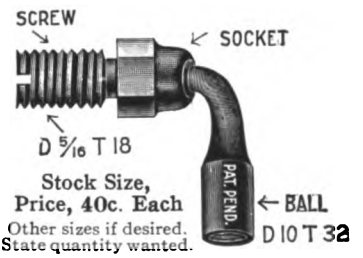

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TERMINALS (Continued)

WIRE TERMINALS (Continued)

STANDARD Battery Connections Co., 27 Copeland St., Roxbury, Mass.

TREGONING Electric Mfg. Co., 224 High Ave., S. E., Cleveland, O.

TESTERS

ACID TESTERS

(See Hydrometers)

BATTERY TESTERS

(See Gauges, Battery)

GASOLINE TESTERS

(See Hydrometers)

THREAD

TOP AND UPHOLSTERY THREAD

AMERICAN Thread Co., Boston, Mass.

CRANSKA Thread Co., Worcester, Mass.

MEYER & Co., John C., Lowell, Mass.

SUMMIT Thread Co., East Hampton, Conn.

TIMERS

IGNITION OR SPARK TIMERS

ACORN Brass Mfg. Co., 51 N. Peoria St., Chicago, Ill.

ALMY Water Tube Boiler Co., foot of Rhoades St., Providence, R. I.

ALTEMUS Mfg. Co., 42d & Chestnut Sts., Philadelphia, Pa. "Ideal." (See page 399.)

AMERICAN Carbureter Co., 29 Atwater St., Detroit, Mich.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Motor Co., Eau Claire, Wis. "Burdick."

APPLE—See Dayton Electrical Mfg. Co.

AUTO & Power Appliance Co., The Arcade, Cleveland, O.

BECKLEY-RALSTON Co., 80-84 Michigan Ave., Chicago, Ill. "Maximus." (See page opposite.)

BEMUS—See Monitor Mfg. Co.

BLACK, A. B., 21 S. Market St., Boston, Mass. "Climax."

BURDICK—See American Motor Co.

CLIMAX—See Black, A. B.

CONNECTICUT Telephone & Electric Co., 45 Britannia St., Meriden, Conn. (See page 101.)

CROUSE-HINDS Co., 808 W. Jefferson St., Syracuse, N. Y.

DARMAC Commutator Co., 220 E. 5th St., St. Paul, Minn.

DAYTON Electrical Mfg. Co., 32 N. St. Clair St., Dayton, O. "Apple."

DOW Portable Electric Co., Adams St., Braintree, Mass.

EISNER—See Gordon Auto Supply Co.

FULMER, C. F., 415 Sycamore St., Plainfield, N. J. "Invincible."

GORDON Auto Supply Co., 1024 Boylston St., Boston, Mass. "Eisner." (See page 437.)

HEINZE Electric Co., Lowell, Mass. (See page 231.)

HERBERT, W. H., 3312 Wabash Ave., Chicago, Ill. "Little Giant."

HERZ & Co., Lafayette & Houston Sts., New York, N. Y. (See yellow insert.)

HIGH Frequency Ignition Coil Co., 2309 S. Main St., Los Angeles, Cal. "Seeley."

HOLTZ—See Illinois Auto & Parts Co.

IDEAL—See Altemus & Co.

ILLINOIS Auto & Parts Co., Globe & Main Sts., Peoria, Ill. "Holtz."

INVINCIBLE—See Fulmer, C. F.

KENT Mfg. Works, Atwater, 44 N. Sixth St., Philadelphia, Pa. (See page 443.)

KINGSTON—See Kokomo Electric Co.

KLAHN—See Mosler & Co.

KOKOMO Electric Co., Kokomo, Ind. "Kingston." (See page 469.)

LACOSTE—See Lovell-McConnell Mfg. Co.

LEAVITT—See Uncas Specialty Co.

LEHMAN Mfg. Co., J. H., 170 Broadway, New York, N. Y. (See red insert.)

LIPMAN Mfg. Co., 210 Pleasant St., Beloit, Wis.

LITTLE GIANT—See Herbert, W. H.

LONG Bros., Kokomo, Ind. (See page 399.)

LOVELL-McCONNELL Mfg. Co., 372 Market St., Newark, N. J. "Lacoste." (See page 115.)

LUNDGREN Mfg. Co., 532 R. E. Trust Bldg., Philadelphia, Pa.

MARINE & Auto Specialty Co., 233 Randolph St., Chicago, Ill. "Sintz."

MASSNICK Mfg. Co., 1559 Jefferson Ave., W., Detroit, Mich.

MAXIMUS—See Beckley-Ralston Co.

MICA Core Mfg. Co., 444 E. 166th St., New York, N. Y. (See page 495.)

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MONITOR Mfg. Co., 1425 Washington St., Boston, Mass. "Bemus."

MOORE—See Palmer-Moore Co.

MOSLER & Co., A. R., 168 West 29th St., New York, N. Y. "Klahn." (See page 203.)

Complete Index to Classification appears on Pages 7 to 12.

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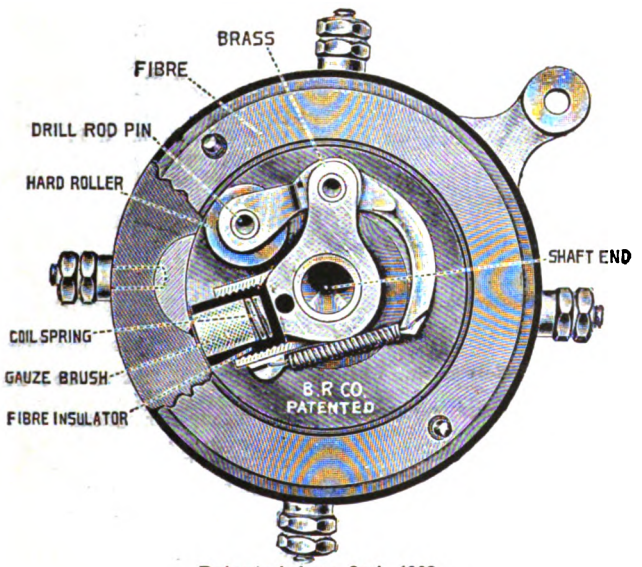
"Everlastingly Good"

THE Maximus Self-Cleaning Timer

More Power

Less Plug Trouble



More Speed

Less Coil Trouble

Patented June 2nd, 1908.

Maximus timers are designed to overcome the weak points of the roller type and to add to the engine's efficiency by giving a positive and accurate current to the spark coils. The objections to the roller type are, the necessity of a long contact, the wearing of the roller and pin and the distributing of metal, dirt and worn particles on the contact surface. These objections are overcome in the **Maximus** by means of an insulated gauze brush, lightly pressed against the contact surface, scraping away any dirt accumulation or any black deposit formed by the arc at the breaking of the contact.

This gives a bright clean surface at all times, allowing of shorter contact segments and by the use of a ground contact plunger contained in the cap or cover, the current consumption is greatly reduced. An extra large roller is employed, same revolving only three and one-half turns to a complete revolution. This saves the wear on the pin.

The end of the shaft is extended into a bearing in the cap or cover which relieves the wear on the main bearing. The outside edge of the fiber is exposed to the air which eliminates the bulging or swelling of same, as when this is enclosed in a shell or body, it is constantly soaked in oil or grease. This edge of the fiber is beveled and overcomes the liability of short circuiting the terminals. Descriptive matter explains why coil and plug troubles are due to poor timers.

LIST PRICES

One-Cylinder	$9.00	Four-Cylinder	$10.00
Two-Cylinder	9.50	Six-Cylinder	14.00

BUICK SPECIAL.

A special model to fit Buick machines is now ready. Easily attached. List, two-cylinder.....$9.50

FORD SPECIAL.

We are prepared to furnish the **Maximus** with all necessary attachments for installing same on Ford Runabouts. Attachment consists of a bevel gear, easily attached to front of camshaft, which allows of the timer being placed in an upright position above the engine. List, four-cylinder complete.....$15.70

MADE BY

THE BECKLEY RALSTON CO.

80-82-84 Michigan Avenue, Chicago, Ill.

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TIMERS (Continued)

IGNITION OR SPARK TIMERS (Continued)

MURDOCK & Son, 33 Wallace Pl., Newark, N. J.

NEWCOMB, A. H., 815 W. 21st St., Chicago, Ill. "Star."

PALMER-MOORE Co., 315 E. Washington St., Syracuse, N. Y. "Moore."

PHILADELPHIA Novelty Supply Co., 33d & Fontain Sts., Philadelphia, Pa.

PHILADELPHIA Timer & Machine Co., 328 Vine St., Philadelphia, Pa. "Velos."
(See page 443.)

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 95.)

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y.
(See page 189.)

QUAD Mfg. Co., 35-37 S. Scioto St., Columbus, O.

ROCHESTER Timer Co., Cox Bldg., Rochester, N. Y. "Rocho."
(See page 433.)

ROCHO—See Rochester Timer Co.

ROBERT Instrument Co., 49 Shelby St., Detroit, Mich.

SCHAAL, W. R., 27 N. Jefferson St., Chicago, Ill. "Simplex."

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.
(See page 97.)

SCHUYLER—See Wray Pump & Register Co.

SEELEY—See High Frequency Ignition Coil Co.

SIMPLEX—See Schaal, W. R.

SINTZ—See Marine & Auto Specialty Co.

STAR—See Newcomb, A. H.

STERLING Alternating Ignition Co., 184 Water St., Binghamton, N. Y.

TRIO Mfg. Co., 60 Woodbridge St., W., Detroit, Mich.

UNCAS Specialty Co., 25 Shipping St., Norwich, Conn. "Leavitt."

VELOS—See Philadelphia Timer & Machine Co.

WACHMAN Auto Mfg. & Supplies, 372 Michigan Ave., Detroit, Mich.
(See page 209.)

WESTERN Motor Co., Logansport, Ind.
(See page 75.)

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., 1876 Broadway, New York, N. Y. "Wico."
(See page 205.)

ZIMMERMAN-SMITH Co., N. Tonawanda, N. Y.

TIPS

BURNER TIPS

(See Burners, Acetylene)

TIRES

EMERGENCY TIRES

(To clamp over rim when regular tire is punctured)

HALF-NELSON Tire Co., 1919 Portland Ave., Minneapolis, Minn.

LEATHER TIRES

(For Leather Treads, see Treads, Detachable)

BEEBE-ELLIOTT Co., 608 Wisconsin St Racine, Wis.
(See page 227.)

HEALY Leather Tire Co., 90 Gold St New York, N. Y.
(See page 441.)

NEW York Antioak Tire Co., 1780 Broadway, New York, N. Y.

REGENT Tire Co., 3313-15 Troost Ave Kansas City, Mo.

SAMSON Leather Tire Co., 1634-42 Broadway, New York, N. Y.

PNEUMATIC TIRES

(See also Tubes, Inner)

AJAX-GRIEB Rubber Co., Trenton, N. J

CONSOLIDATED Rubber Tire Co., Akron, O. "Kelly-Springfield."

CONTINENTAL Caoutchouc Co., 43 Warren St., New York, N. Y. (Importers).

CORD—See Goodyear Tire & Rubber Co.

COURTNEY Rubber Co., 1976 Broadway, New York, N. Y.

CRYDER & Co., 583 Park Ave., New York, N. Y. (Importers). "Kempshall."

DIAMOND Rubber Co., Akron, O.

EMPIRE Automobile Tire Co., Mulberry & Clinton Ave., Trenton, N. J.

ENNIS Rubber Mfg. Co., Commercial St Newark, N. J.
(See page 199.)

FAURE, Alexandre, 168 W. 25th St., New York, N. Y. (Importer). "Palladium."

FEDERAL Rubber Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Miller & Sweitzer Ave., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass
(See page 197.)

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O. "Cord."
(See page 199.)

HARTFORD Rubber Works Co., Hartford, Conn.

HERZ & Co., Lafayette & Houston St New York, N. Y. (Importers).
(See yellow insert.)

HOME Tire Co., Trenton, N. J.
(See page 505.)

KELLY-SPRINGFIELD — See Consolidated Rubber Tire Co.

KEMPSHALL—See Cryder & Co.

KOKOMO Rubber Co., Kokomo, Ind.

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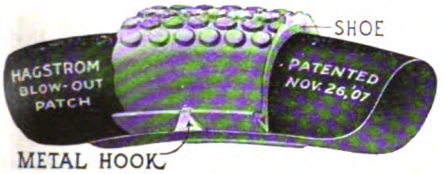
GREATEST AUTO TIRE ACCESSORY



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The Post-Lester Co., of Hartford, Conn., our New England distributors; Charles J. Downing, 56 Warren St., New York City sales agent; our Chicago representative, S. Breakstone, 900 Fisher Bldg.; Studebaker & Co., of Salt Lake City, Utah, also George P. Wells, Golden Gate Ave., San Francisco, Cal.

All jobbers will handle the Hagstrom Blow-out patch. Ask for quotations for the '09 season.

Manufactured only by **HAGSTROM BROS. MFG. CO.,** sole owners and patentees, **Lindsborg, Kan., U.S.A.**

Republic Tires

STAGGARD TREAD

Our Staggard Tread is the only non-skid device which is durable enough to be used all the time. Dotted rubber treads and steel studs are so short lived that most drivers use them only in wet weather, but the Republic Staggard Tread Tires outlast smooth treads. These tires have solid rubber protuberances which are so long and so big that the thrust of the wheel never tears them off.

We are selling thousands of these treads for use in cities where the sprinkling of the asphalt pavements produces dangerous skidding conditions even in fair weather.

Republic Rubber Company

Youngstown, Ohio

New York City, N. Y., 232 W. 58th St.
Boston, Mass., 221 Pleasant St.
Chicago, Ill., 116 Lake Street
Philadelphia, Pa., 830 N. Broad St.
Cincinnati, O., 8th and Walnut Sts.
Cleveland, O., 1120 Euclid Ave.
Detroit, Mich., 246 Jefferson Ave.
St. Louis, Mo., 3964 Olive St.
Denver, Colo., 1721 Stout Street
San Francisco, Cal., 119 Beale St.
Toledo, O., 2815 Monroe Street
Indianapolis, Ind., 208 S. Illinois St.
Pittsburg, Pa., 136 6th St.
Seattle, Wash., 1419 Broadway
Los Angeles, 1046 So. Main St.

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TIRES (Continued)

PNEUMATIC TIRES (Continued)

LOCKPORT Rubber Works, Lockport, N. Y.

MICHELIN Tire Co., Milltown, N. J. (See page 223.)

MORGAN & Wright, Detroit, Mich. (See page opposite.)

PALLADIUM—See Faure, Alexandre.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PIRELLI & Co., 296 Broadway, New York, N. Y. (Importers).

PNEU l'Electric Co., 1610 Broadway, New York, N. Y. (Importers.) (See page 269.)

REPUBLIC Rubber Co., Youngstown, O. (See page 269.)

RUTHERFORD Rubber Co., Rutherford, N. J. "Sterling." (See page opposite.)

STERLING—See Rutherford Rubber Co.

TRACTION Tread Tire & Tube Co., 1695 Broadway, New York, N. Y.

TRIDENT Tire Co., 1593 Broadway, New York, N. Y.

WALPOLE Rubber Works, Walpole, Mass. (See page 177.)

ZEGLEN Bullet-Proof Cloth Co., 1532-34 Michigan Ave., Chicago, Ill.

SOLID TIRES

CONSOLIDATED Rubber Co., Akron, O.

DIAMOND Rubber Co., Akron, O.

FIRESTONE Tire & Rubber Co., Miller St. & Sweitzer Ave., Akron, O.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O. (See page 199.)

HARTFORD Rubber Works Co., Hartford, Conn.

KOKOMO Rubber Co., Kokomo, Ind.

MILFORD Rubber Works, Milford, Ill.

MORGAN & Wright, Detroit, Mich. (See page opposite.)

MOTZ Clincher Tire & Rubber Co., Akron, O.

PALMER-HAWKINS Rubber Tire Co., Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

REPUBLIC Rubber Co., Youngstown, O. (See page 269.)

SWINEHART Clincher Tire & Rubber Co., Akron, O.

SPECIAL TIRES

AMERICAN Auto Tire Co., 228 Cherry St., Toledo, O. "McNaull."

BALL Bearing Tire Co., 159 Aborn St., Providence, R. I.

BRAMELD Non-Collapsable Pneumatic Tire Co., 22 Hopper St., Paterson, N. J. (See page 447.)

CARHART Laminated Tire Co., 722 Congress Ave., Austin, Tex.

CLEVELAND Puncture Proof Tire Co., 1420 E. 89th St., Cleveland, O.

COMMONWEALTH Rubber Co., Reading, Mass. "Mitchell."

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, O.

ELDER Mfg. Co., 2305 N. Illinois St., Indianapolis, Ind.

GOSHEN Tire & Rubber Co., Goshen, Ind.

HUBBARD—See Middleton, Arthur H.

McNAULL—See American Auto Tire Co.

MIDDLETON, Arthur H., 2821 Broad St. Philadelphia, Pa. "Hubbard."

MITCHELL—See Commonwealth Rubber Co

MOTZ Clincher Tire & Rubber Co., Akron, O.

ST. JOHNS Rubber Tire Co., 116 Broad St., New York, N. Y.

SHAWMUT Tire Co., 97 Bedford St., Boston, Mass.

SWINEHART Clincher Tire & Rubber Co., Akron, O.

USINA, E. A. (E. Orange), Orange, N. J.

TOOLS

CHAIN REPAIR TOOLS.

ADAPT Machine Co., 1610 Wabash Ave., Chicago, Ill. (See page 221.)

BROWN Mfg. & Garage Co., J. C., Butler Ind.

HARRIS & Reed Mfg. Co., 531-51 W. 15th St., Chicago, Ill.

NEVER-MISS Spark Plug Co., Lansing Mich. (See page 101.)

WEEBER Mfg. Works, C. F., Albany, N. Y

TIRE TOOLS

(For taking off and putting on tires)

ATLAS—See United States Jack Co.

AUTO Improvement Co., 816 Hudson St. New York, N. Y. "Ever Ready."

BLANCHARD, A. W., 10 Clinton St., Brooklyn, N. Y.

EVER READY—See Auto Improvement Co

H & H—See Heller, L. L.

HELLER, L. L., Water St., Binghamton N. Y. "H. & H."

L. & M.—See Long & Mann Co.

LONG & Mann Co., 527 Graves St., Rochester, N. Y. "Minute," "L. & M."

MAXWELL & Co., L. R., Cedar Rapids, Ia.

MINUTE—See Long & Mann Co.

NOONAN Tool & Machine Works, A. S., 10 E. Dow St., Rome, N. Y.

PETRY, N. A., 420 Commerce St., Philadelphia, Pa. "Pilliner."

PILLINER—See Petry, N. A.

POLSON, W. F., 27 Chenango St., Buffalo N. Y.

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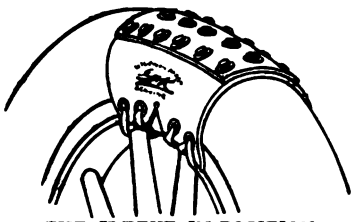
A Sure Relief for "BLOW OUT" Troubles



THE SLEEVE IN POSITION

THE G&K TIRE SLEEVE

Low cost; long life; easy to put on.
Write for descriptive folder and "special terms."

The Graton & Knight Mfg. Co.

Oak Leather Tanners and Belt Makers
Worcester, Massachusetts

RUTHERFORD RUBBER CO.

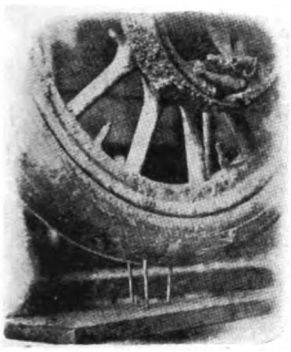
MANUFACTURERS OF

TROJAN TIRES & TUBES

FOR THE

TRADE ONLY.

Rutherford, N. J.



ABSOLUTELY PREVENTS PUNCTURES

Have you seen our "Non-Puncture Inner Case"?
This invention is made of the best rubber and fabric obtainable and armor-plate steel discs are so vulcanized into the Tread, as to render it impossible to penetrate to the Inner Tube.
The fabric is extended down to the Bead of the Tire practically incasing the Inner Tube, and greatly reinforcing the walls of the Tire.
More resilient than the tire itself.
Does not retard speed.
Increases Tire Mileage 50%.
Equipped with "Inner Cases" your Tire Problem is solved.
Fits perfectly any make of tire.
Can be applied by any one.

ATLAS RUBBER CO., Buffalo, N. Y.

MORGAN & WRIGHT TIRES

ARE GOOD TIRES

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TOOLS (Continued)

TIRE TOOLS (Continued)

RHODES Mfg. Co., Lane Ave. & Sibley St., Grand Rapids, Mich.

SHAWVER Co., Springfield, O. "Springfield."

SPRINGFIELD—See Shawver Co.

STANDARD Auto Specialty Co., 56 Boerum St., Brooklyn, N. Y.

UNITED States Jack Co., 128-30 W. Lake St., Chicago, Ill. "Atlas."

VALVE GRINDING TOOLS

BROWN, Co., 517 E. Water St., Syracuse, N. Y.

JEF Mfg. Co., 1562 Broadway, Denver, Col.

VALVE LIFTING TOOLS

BUCHANAN, E. L., 1900 Broadway, New York, N. Y. "Real Thing."

CYCLONE—See Garage Equipment Co.

GARAGE Equipment Co., Milwaukee, Wis. "Cyclone."

MECHANICAL & Electrical Mfg. Co., 54 N. Desplaines St., Chicago, Ill. "Triumph."
(See page 265.)

MOUND Tool & Scraper Co., 708 Howard St., St. Louis, Mo.
(See page 355.)

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

REAL THING—See Buchanan, E. L.

TRIUMPH—See Mechanical & Electrical Mfg. Co.

WEEBER Mfg. Works, C. F., Albany, N. Y.

WHITE, Sam B., 84 Broadway, Providence, R. I.

VALVE SEATING OR FACING TOOLS

CRONE Auto Co., F. G., 49 E. Utica St., Buffalo, N. Y.

LONG & Mann Co., 527 Graves St., Rochester, N. Y.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

TOPS

AUTOMOBILE TOPS

AMERICAN Top Co., Jackson, Mich.

AMESBURY Top Co., Cedar St., Amesbury, Mass.

ANDERSON & Co., F. W., 729 N. Uber St., Philadelphia, Pa.

AUTO Accessories Co., Detroit, Mich. "Sterling."
(See page 237.)

AUTO Top Co., 209 E. Columbia St., Fort Wayne, Ind.
(See page 277.)

AUTO Top & Body Co., 249 N. Watts St., Philadelphia, Pa.

AUTO Top & Trimming Co., Pontiac, Mich.
(See page 275.)

AUTO Cape Top Co., 1466 Michigan Ave., Chicago, Ill.

AUTOMOBILE Buggy Top Co. of America, Noxen, Pa.

BAILEY & Bowne, Whitesboro & Wiley Sts., Utica, N. Y.

BALL Buggy Top Co., York, Pa.

BALTIMORE Buggy Top Co., 700-02 Pennsylvania Ave., Baltimore, Md.

BAUER Bros., 937 W. 8th St., Cincinnati, O.

BLASIER Mfg. Co., M. E., 63 Columbia St., Utica, N. Y.

BLISS, Chas. P., Denver, Colo.

BLUE Ribbon Auto & Carriage Co., 130-70 Cannon St., Bridgeport, Conn.

BOSCHE Bros., 920 Main St., Buffalo, N. Y.

BRIDGEPORT Vehicle Co., South Ave. & Water St., Bridgeport, Conn.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROC Carriage & Wagon Co., E. 40th St. & Payne Ave., Cleveland, O.

BROWN Auto Top Co., 437-39 N. Broad St., Philadelphia, Pa.

BUFFALO Auto Body & Trimming Co., 341 Ellicott St., Buffalo, N. Y.

BUOB & Scheu, 1408-10 Gilbert Ave., Cincinnati, O.
(See page 275.)

CASE, J. F., 1 Spring St., Ashtabula, O.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill.
(See page 237.)

COLLINS & Son, G. A., Main & Church St., Akron, O.

COLLINSON, M., 1253 Michigan Ave., Chicago, Ill.

COLUMBIA Auto Top Co., 17 Dwight St., Springfield, Mass.

CRAY Bros., 1111 W. 11th St., Cleveland, O.

CRESCENT Auto Top Co., 58 W. 43d St., New York, N. Y.

CUTTER, J. Frank, 414 Main St., Cambridge, Mass.

DEMAR Co., J. E., 244-48 W. 49th St., New York, N. Y.

DENNISTON, E. E., 184 W. Mohawk St., Buffalo, N. Y.

DETROIT Auto Top Co., Detroit, Mich.

DETROIT Motor Car Supply Co., 1250 Jefferson Ave., Detroit, Mich.

DUANE & Co., W. J., 1771 Broadway, New York, N. Y.

DUNHAM & Son, D. B., 128 Irving St., Rahway, N. J.
(See page 299.)

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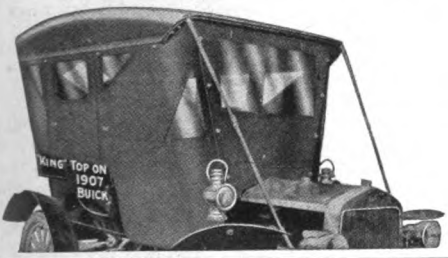
TOPS THAT FIT



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DAYTON, O.

TWO EMPIRE TOP FACTORIES
207 N. 22ND ST. PHILA. PA.
509 W. 30TH ST. NEW YORK.

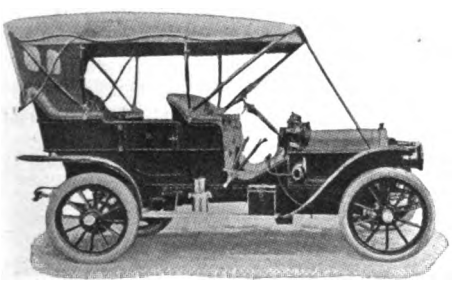
EMPIRE

TOPS, WIND SHIELDS
FOLDING SEATS
BOW SEPARATOR AND HOLDER

Our two factories and increased manufacturing facili ies enable us to guarantee immediate delivery in any quantity.

EMPIRE AUTO TOP COMPANY, 207 North 22nd Street, Philadelphia, Pa

AUTOMOBILE TOPS



TOPS FOR TOURING CARS
TOPS FOR RUNABOUTS

We manufacture "HIGH GRADE" Tops for all kinds of Automobiles

NEW GOODS NEW STYLES NEW PRICES

Write us and we will demonstrate to you that our 1908 Materials are the best; our 1908 Styles are the latest; our 1908 Prices are the lowest.

THE MICHIGAN TOP CO., Detroit, Mich.
E. H. COOMBS, Manager
17 Duffield Street

EUREKA TOPS

WE make a specialty of building Auto Tops for the manufacturer, jobber and dealer. We can make any kind of top you want, or can duplicate tops you are now buying and save you money. Our location and facilities enable us to make tops for less money than any other builder. CAPACITY, 15000 TOPS. Prices quoted delivered in local or car lots.

THE EUREKA CO. Top Dept. Rock Falls, Ill.

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TOPS (Continued)

AUTOMOBILE TOPS (Continued)

ELGIN Carriage Trimming Co., Brook & River Sts., Elgin, Ill.

EMPIRE Auto Top Co., 207 N. 22d St., Philadelphia, Pa.
(See page 273.)

EMPIRE Auto Top Co., 509 W. 30th St., New York, N. Y.

EUREKA Co., Rock Falls, Ill.
(See page 273.)

EVERITT Co., B. F., 506 Clay Ave., Detroit, Mich.

FALLS City Buggy Top Co., 218-20 W. First St., Louisville, Ky.

FELLWOCK Automobile & Mfg. Co., 320 Upper 4th St., Evansville, Ind.

FICKLING & Co., 154 E. 57th St., New York, N. Y.

FLURKEY Carriage & Trimming Co., 566 Wabash Ave., Chicago, Ill.

FRANK, W. H., New Rochelle, N. Y.

FRAZIER & Co., W. S., Aurora, Ill.

HILL Manufacturing Co., 25-27 Fuller St., Buffalo, N. Y.

HOLBROOK-SINGER Co., 509-15 W. 56th St., New York, N. Y.

HOLCKEN-ELBERG Carriage & Rubber Co., 1420 McGee St., Kansas City, Mo.

HOLCOMBE Co., 105 Goffe St., New Haven, Conn.

HORTSMAN, Louis F., 107 E. Superior St., Ft. Wayne, Ind.

HUME Carriage Co., 66-68 Stanhope St., Boston, Mass.

INDIANAPOLIS Dash Co., 2116 S. Meridian St., Indianapolis, Ind.

IRVIN Mfg. Co., Tenth & Canal Sts., Indianapolis, Ind.

JOHNSON, A. D., 1221 Michigan Ave., Chicago, Ill.

KARBACH Automobile & Vehicle Co., 13th & Howard Sts., Omaha, Neb.

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill.
(See page 59.)

KING Spring Co., Buffalo, N. Y.

KING Top Mfg. Co., Dayton, O.
(See page 273.)

KRAMER & Co., Wm. F., Canal St., Dayton, Ohio.

KROH Mfg. Co., C. Z., 1212-14 Jackson Ave., Toledo, O.

LAMÁN Auto Top Co., L. L., Utica, N. Y.
(See page 233.)

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill.

LONDON Auto Supply Co., 1235 Michigan Ave., Chicago, Ill.
(See page 457.)

LONGDIN-BRUGGER Co., Fond-du-Lac, Wis.

LOUD, Fred A., Merrimac, Mass.

McCLELLAN, Chas. P., Fall River, Mass.

MANHATTAN Auto Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MASON, John A., 312 Washington St., Newton, Mass.

MATT & Co., F., 459 Washington St., Newark, N. J.

MAUS, W. L., 736 W. Colfax Ave., Denver, Col.

MEYER & Son, C. G., 18-20 Ann St., Tiffin, O.

MICHIGAN Top Co., 15-17 Duffield St., Detroit, Mich.
(See page 273.)

MODERN Autotop Co., 18 St. Clair Ave., Cleveland, O.

MONARCH Auto Top & Supply Co., 1218-20 Michigan Ave., Chicago, Ill.

MOTOR Specialty Co., 239 Jefferson Ave., E., Detroit, Mich.

MURRAY & Co., P. A., Newton, Mass.

MYERS Auto Top Co., Dayton, O.

NATIONAL Auto Top Co., 1904 Broadway, New York, N. Y.
(See page 277.)

NEWTON & Son, W. H., 127 Elm St., Cortland, N. Y.

NEW England Auto Top Co., 229 W. 54th St., New York, N. Y.
(See page 397.)

NEW York Auto Top & Supply Co., 286 Halsey St., Newark, N. J.

NICHOLS & Co., D. P., 116-122 W. Brookline St., Boston, Mass.

NOLAN, Wm., 541 Tremont St., Boston, Mass.

PARSONS-CURTIS Top Co., 70 W. Jackson Blvd., Chicago, Ill.

PEASE & Sons, S. C., Main St., Merrimac, Mass.

PHELPS Auto Top & Trimming Co., F. Z., 1292 Niagara St., Buffalo, N. Y.

PHELPS Carriage Co., 20 C Ave., Sidney, N. Y.

RACINE Buggy Top Co., Racine, Wis.

RANDS Mfg. Co., 51-55 Macomb St., Detroit, Mich.

REARDON, J. J., Clark St., Amesbury, Mass.

RITTER Mfg. Co., 63 Amsterdam Ave., Detroit, Mich.

ROBBINS & Co., Irvin, Tenth & Canal Sts., Indianapolis, Ind.

ROSS & Browne, 6127-29 Cottage Grove Ave., Chicago, Ill.

RUSSELL, H. J., 32 Exchange St., Worcester, Mass.

ST. LOUIS Buggy & Auto Top Co., 2117-19 N. Ninth St., St. Louis, Mo.

SCHUBERT Bros. Gear Co., 42-44 Cedar St., Oneida, N. Y.

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SNOW & Co., N. H., Binghamton, N. Y.

SPRAGUE Umbrella Co., Norwalk, O.

SPRINGFIELD Auto Top & Upholstering Co., 102-06 Dwight St., Springfield, Mass.
(See page opposite.)

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 55.)

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O.

STERLING—See Auto Accessories Mfg. Co.

STONE & Sons, C., 167-77 Ogden Ave., Chicago, Ill.

THOMPSON Co., E. J., 5917-19 Penn Ave., Pittsburg, Pa.

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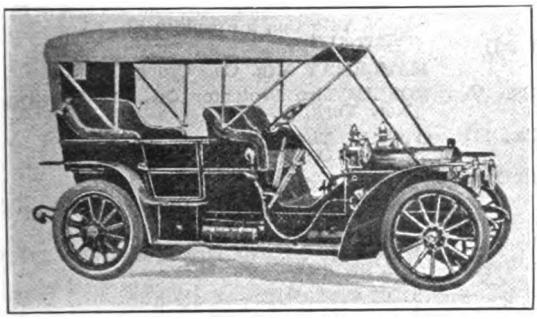

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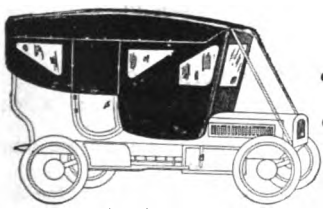

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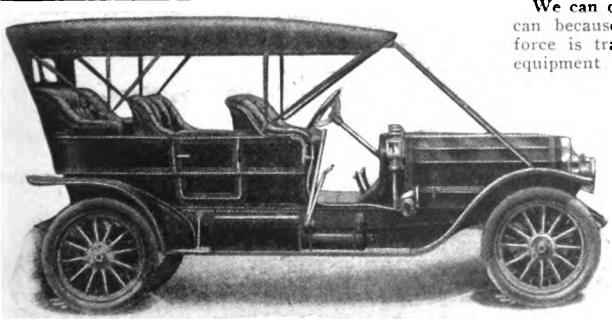

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TOPS (Continued)

AUTOMOBILE TOPS (Continued)

TROY Carriage Sunshade Co., Troy, O. (See page 235.)

UNITED STATES Dash & Fender Co., 147 E. 42d St., New York, N. Y.

VEHICLE Top & Supply Co., 900-06 Cass Ave., St. Louis, Mo. "Vesco." (See page opposite.)

VESCO—See Vehicle Top & Supply Co.

VETTER Top Co., 49 W. 66th St., New York, N. Y.

WARNER Pole & Top Co., 1648 Central Ave., Cincinnati, O.

WAUGH & Co., Chas., 856-864 Main St., Cambridge, Mass.

WAYMAN & Murphy, Lake & Sangamon Sts., Chicago, Ill.

WEISS & Son, Chas., 4800 Cottage Grove Ave., Chicago, Ill. (See page 115.)

WOOD & Son, Fred'k R., 217 W. 19th St., New York, N. Y.

ZIMMERMAN & Sons, F. F., Main St., Waupun, Wis.

TREADS

DETACHABLE TIRE TREADS OR PROTECTORS

ATLAS Rubber Co., Buffalo, N. Y. (See page 271.)

BAILEY & Co., C. J., 22 Boylston St., Boston, Mass.

BARRETT—See Lynn Auto Co.

BEEBE-ELLIOTT Co., 608 Wisconsin St., Racine, Wis. "Defender." (See page 227.)

BRICTSON Mfg. Co., Brookings, S. D.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

BURNAM—See Huntsville Motor Car Co.

CARPENTER Auto Specialty Co., 1912 Prospect Ave., S. E., Cleveland, O.

CASE Casing Co., Mt. Pleasant, Iowa.

DAVIS Robe Co., 126 State St., Chicago, Ill.

DEFENDER—See Beebe-Elliott Co.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

DETROIT Leather Works, 844 Woodward Ave., Detroit, Mich. "Knight." (See page 493.)

FAIRHURST, I. J. D., Janesville, Wis. "Rock Crusher."

HEALY Leather Tire Co., 90 Gold St., New York, N. Y. See page 441.)

HUNTSVILLE Motor Car Co., Huntsville, Ala. "Burnam."

KIMBALL Tire Case Co., 171 Broadway, Council Bluffs, Ia.

KNIGHT—See Detroit Leather Specialty Co.

LEATHER Tire Goods Co., Newton Upper Falls, Mass. "Woodworth." (See page 199.)

LYNN Auto Co., 9 Franklin St., Lynn, Mass. "Barrett."

MAPLEBAY Mfg. Co., Crookston, Minn.

NOSLIP Tire Protector Co., 111 Broadway, New York, N. Y.

O'NEILL Tire & Protector Co., Buchtel Ave., Akron, O.

PERFECT Tire Cover Co., Rock Rapids, Ia.

PERKINS-CAMPBELL Co., 620 Broadway, Cincinnati, O. "Twentieth Century."

REPUBLIC Rubber Tire & Shoe Co., 449 W. 53d St., New York, N. Y.

ROCK CRUSHER—See Fairhurst, I. J. D.

SAMSON Leather Tire Co., 1634-42 Broadway, New York, N. Y.

SLAMA Tire Protector Co., 609 E. 15th St., Kansas City, Mo.

STANDARD Auto Co., Saginaw, Mich.

TRIPLE-TREAD Auto Tire Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

TWENTIETH CENTURY — See Perkins-Campbell Co.

UNIVERSAL Tire Protector Co., Angola, Ind.

WHEELER, G. G., 128 Washington St., Canandaigua, N. Y.

WISCONSIN Tire Protector Co., 1229 Michigan Ave., Chicago, Ill.

WOODWORTH—See Leather Tire Goods Co.

TRIMMINGS

CLOTH AND CARPET TRIMMINGS

(See also Broadcloth; also Buttons; also Carpet; also Cloth; also Lace; also Linoleum; also Silk; also Whipcord)

BRIDGEPORT Coach Lace Co., 805 Wood Ave., Bridgeport, Conn.

CARR, F. S., 74 Pearl St., Boston, Mass. (See page 505.)

CHANDLER Oil Cloth & Buckram Co., East Taunton, Mass.

CHASE Co., L. C., Boston, Mass. (See page 65.)

DERBY & Co., W. E., 34 Greene St., New York, N. Y.

DUSENBURY, Louis, 79 Worth St., New York, N. Y.

GERHAB, Jacob, 158-164 No. 3d St., Philadelphia, Pa.

GERHAB & Ludlain, 305 Cherry St., Philadelphia, Pa.

GIFFORD & Son, John A., 25 Park Pl., New York, N. Y.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

HORSTMAN Co., Wm. H., 5th & Cherry Sts., Philadelphia, Pa.

HOWELLS Bros., 78 Worth St., New York, N. Y.

LAIDLAW, Jr., Wm. R., 244-50 W. 49th St., New York, N. Y. (See page 471.)

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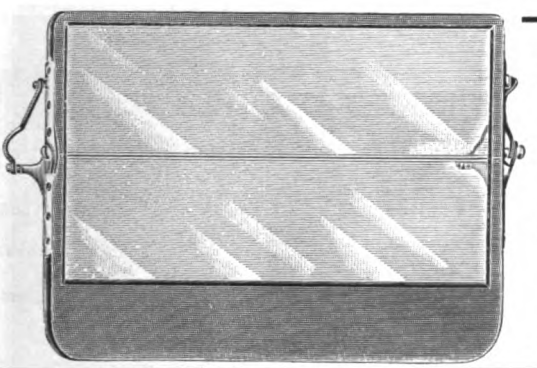

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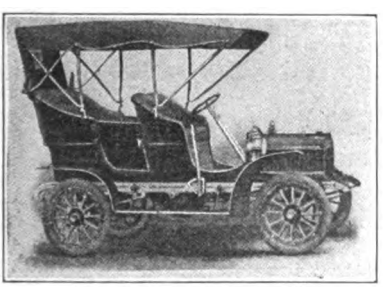

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MANUFACTURERS' Selling Co., 1777 Broadway, New York, N. Y.

MONARCH Rubber Co., 41 N. 7th St., Philadelphia, Pa.

MUTTY Co., L. J., Boston, Mass. (See page opposite.)

NATIONAL Hardware Co., 327-29 W. Fourth St., Cincinnati, O.

NORRIS & SONS, R. W., 346-48 N. Gay St., Baltimore, Md.

O'BANNON Corp., 72 Duane St., New York, N. Y. (See page 161.)

PATTERSON & Greenough, 346 Broadway, New York, N. Y.

RARITAN Woolen Mills, 14 White St., New York, N. Y.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

ROGERS & Co., E. F., Philadelphia, Pa.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

SLATER & Sons, S., 47 Worth St., New York, N. Y.

TIEL & Co., Geo., 413 Arch St., Philadelphia, Pa.

VOGT Mfg. & Coach Lace Co., 332-334 St. Paul St., Rochester, N. Y.

WIESE & Co., Wm., 66-68 Greene St., New York, N. Y.

METAL TRIMMINGS

(See also Fasteners, Curtain; also Fittings, Top; also Forgings, Drop; also Handles, Door; also Hinges, Door; also Locks, Door; also Irons, Slat; also Irons, Top; also Mouldings, Brass; also Rests, Bow; also Separators, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

BARLOW Mfg. Co., Holyoke, Mass.

BLAKESLEE Forging Co., Plantsville, Conn.

COWLES & Co., C., New Haven, Conn. (See page 143.)

CURRY & Abeles, 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., 302 Grand River Ave., Detroit, Mich. (See page 63.)

ENGLISH & Mersick Co., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

FOWLER Brass Works, 2333-37 Wabash Ave., Chicago, Ill. (See page 451.)

GLOBE Brass Works, 15-17 Macomb St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

METAL Stamping Co., 243 West St., New York, N. Y.

MONARCH Carriage Goods Co., 2838-44 Spring Grove Ave., Cincinnati, O.

MURDOCK, Jr., Co., Jas., 116 Opera Pl., Cincinnati, O.

MURPHY Co., G. W. J., Merrimac, Mass. (See page 233.)

NON-CORROSIVE Metal Co., Watertown, Mass. (See page 233.)

NONPAREIL Brass Co., 143 Summer St., Providence, R. I. (See page 391.)

NOVELTY Mfg. Co., Waterbury, Conn. (See page 321.)

SCHERER & Co., H., 280 Jefferson Ave., Detroit, Mich.

SMITH & Son, Jos. N., 154-62 Fourth St., Detroit, Mich.

TAYLOR Co., H. D., 101-105 Oak St., Buffalo, N. Y.

TURNER Brass Works, Sycamore, Ill.

VICTOR Metals Co., 29 Broadway, New York, N. Y.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WING Co., Charles, 5 Water St., Amesbury, Mass. (See page 425.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn. (See page 141.)

TRUCKS

REPAIR TRUCKS

(For lying on when making repairs underneath a car.)

BROWN Co., 517 E. Water St., Syracuse, N. Y.

GRAND Rapids Spring Co., Grand Rapids, Mich.

TRUNKS

LEATHER AUTOMOBILE TRUNKS

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

FULLER Company, G. W., 182-184 Asylum St., Hartford, Conn.

HASKELL Bros., 94 Wabash Ave., Chicago, Ill.

MASON, John A., 312 Washington St., Newton, Mass.

MORRISON & Co., L. E. H., 25-29 W. Washington St., Indianapolis, Ind.

TAYLOR Trunk Co., C. A., 39 Randolph St., Chicago, Ill.

WARREN Leather Goods Co., 80 Austin St., Worcester, Mass.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

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METAL AUTOMOBILE TRUNKS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 219.)

AUTO Rebuilding Co., 364 Wabash Ave., Chicago, Ill. (See page 353.)

TUBES

INNER TUBES

(For Complete Tires—See Tires, Pneumatic)

AJAX-GRIEB Rubber Co., Trenton, N. J.

ALPHA—See Parker, Stearns & Co.

CONTINENTAL Caoutchouc Co., 43 Warren St., New York, N. Y. (Importers).

CONTINENTAL Rubber Works, 19th & Liberty St., Erie, Pa.

DIAMOND Rubber Co., Akron, O.

EMPIRE Automobile Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

FAULTLESS Auto Tube Co., Thoroughfare Bldg., New York, N. Y. (See page 427.)

FEDERAL Rubber Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Miller St. & Swetzer Ave., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass. (See page 197.)

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O. "Red Seal." (See page 199.)

GUARANTEED Faultless Auto Tube Co., 104 W. 42d St., New York, N. Y.

HARTFORD Rubber Works Co., Hartford, Conn.

HOME Tire Co., Trenton, N. J. (See page 505.)

KANTLEEK—See Seamless Rubber Co.

LEATHER Tire Goods Co., Newton Upper Falls, Mass. "Woodworth." (See page 199.)

LOCKPORT Rubber Works, Lockport, N. Y.

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

MICHELIN Tire Co., Milltown, N. J. (See page 223.)

MORGAN & Wright, Detroit, Mich. (See page 271.)

P. & H. Tire Co., 1657 Broadway, New York, N. Y.

PARKER, Stearns & Co., 228 South St., New York, N. Y. "Alpha."

PENNSYLVANIA Rubber Co., Jeannette, Pa.

RED SEAL—See Goodyear Tire & Rubber Co.

RUTHERFORD Rubber Co., Rutherford, N. J. (See page 271.)

SEAMLESS Rubber Co., New Haven, Conn. "Kantleek."

TRACTION Tread, Tire & Tube Co., 1695 Broadway, New York, N. Y.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J. (See page 45.)

WOODWORTH—See Leather Tire Goods Co.

SPEAKING TUBES

BRIDGEPORT Coach Lace Co., 805 Wood Ave., Bridgeport, Conn.

COLUMBIA—See Hortsmann Co.

COWLES & Co., C., New Haven, Conn. (See page 143.)

ENGLISH & Mersick Co., New Haven, Conn

HORTSMANN Co., Wm. H., 5th & Cherry Sts., Philadelphia, Pa. "Columbia."

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). (See page 179.)

PARRY & Co., A. N., Amesbury, Mass.

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

STRONG, M. H., 168 South Ave., Rochester, N. Y. (See page 135.)

TUBING

BRASS AND COPPER TUBING

AMERICAN Tube Works, 95 Broad St., Boston, Mass.

ANSONIA Brass & Copper Co., Ansonia, Conn.

BENEDICT & Burnham Mfg. Co., Waterbury, Conn.

BRIDGEPORT Brass Co., 253 Broadway, New York, N. Y. (See page 215.)

BUFFALO Tube Co., 259 Rano St., Buffalo, N. Y. (See page opposite.)

CHICAGO Brass Co., Kenosha, Wis.

COE Brass Mfg. Co., Torrington, Conn.

CORNELIUS, Gustave, Wolcott St., Waterbury, Conn.

DALLAS & Son, A. C., 163 Randolph St., Chicago, Ill. (Dealers.) (See page opposite.)

FRENCH Mfg. Co., 142 Robbins St., Waterbury, Conn. (See page 285.)

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia. (See page opposite.)

LINTON & Co., 93 Pine St., Providence, R. I.

MICHIGAN Copper & Brass Co., Detroit, Mich.

NEW Jersey Tube Co., Kingsland Ave., Harrison, N. J.

RANDOLPH - CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

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TUBING (Continued)

BRASS AND COPPER TUBING (Continued)

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I. (See page 281.)

WATERBURY Mfg. Co., Waterbury, Conn.

WELLS & Co., A. H., Watertown Road, Waterbury, Conn.

COPPER TUBING

(See Tubing, Brass and Copper)

FIBRE TUBING

(See Fibre, Hard)

FLEXIBLE METALLIC TUBING

ALMOND Mfg. Co., T. R., 1 Maple St., Ashburnham, Mass. (See page opposite.)

AMERICAN Metal Hose Co., 173-77 Lafayette St., New York, N. Y. "Nyflexmet." (See page opposite.)

AUTOMOBILE Supply Mfg. Co., 139 Emerson Pl., Brooklyn, N. Y.

FLOWER & Co., Walter L., St. Louis, Mo.

LOMBARDI Motor Co., Derby, Conn.

MANHATTAN Screw & Stamping Works, West End Ave., New York, N. Y. (See page 157.)

NATIONAL Flexible Tube Co., 320 Driggs Ave., Brooklyn, N. Y.

NYFLEXMET—See American Metal Hose Co.

OSBORNE & Stephenson Mfg. Co., Plainville, Conn. (See page 141.)

SMITH & Co., Albanus L., 1305 Arch St., Philadelphia, Pa.

STANDARD Metal Mfg. Co., Chestnut, Jefferson & Malvern Sts., Newark, N. J. (See page 441.)

TRIPARI Bros. & V. De Prisco Co., 372-74 Broome St., New York, N. Y.

HARD RUBBER TUBING

(See Rubber, Hard)

SOFT RUBBER TUBING

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

CANFIELD Rubber Co., 708 Railroad Ave., Bridgeport, Conn.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber Mfg. Co., Trenton, N. J.

MATTSON Rubber Co., Lodi, N. J. (See page 151.)

MILFORD Rubber Works, Milford, Ill.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

SEAMLESS Rubber Co., New Haven, Conn.

TRENTON Rubber Mfg. Co., 3100 State St., Trenton, N. J. (See page 45.)

UNITED & Globe Rubber Mfg. Co., Trenton, N. J.

STEEL TUBING

AMERICAN Tube & Stamping Co., 471 Hancock Ave., Bridgeport, Conn. (See page 225.)

CLEVELAND Tool & Supply Co., Cleveland, O. (Dealers). (See page opposite.)

DELAWARE Seamless Tube Co., Auburn, Pa.

DETROIT Seamless Steel Tubes Co., 833 River St., Detroit, Mich.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa. (See page 281.)

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

PITTSBURG Seamless Steel Tube Co., Beaver Falls, Pa.

SEAMLESS Tube Co. of America, Frick Bldg., Pittsburg, Pa.

SHELBY Steel Tube Co., 1714 Frick Bldg., Pittsburg Pa.

STANDARD Welding Co., Cleveland, O. (See page 263.)

TURN-BUCKLES

WROUGHT TURN-BUCKLES

CENTRAL City Bolt Co., Syracuse, N. Y.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CONTINENTAL Bolt & Iron Works, Chicago, Ill.

DETROIT Screw Works, Detroit, Mich. (See page 483.)

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

HOOPES & Townsend Co., Philadelphia, Pa.

KANSAS City Bolt & Nut Co., Kansas City, Mo.

MERRILL Bros., Maspeth, N. Y.

MICHIGAN Bolt & Nut Co., foot Meldrum Ave., Detroit, Mich.

NEW England Bolt & Nut Co., 267 Atlantic Ave., Boston, Mass.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

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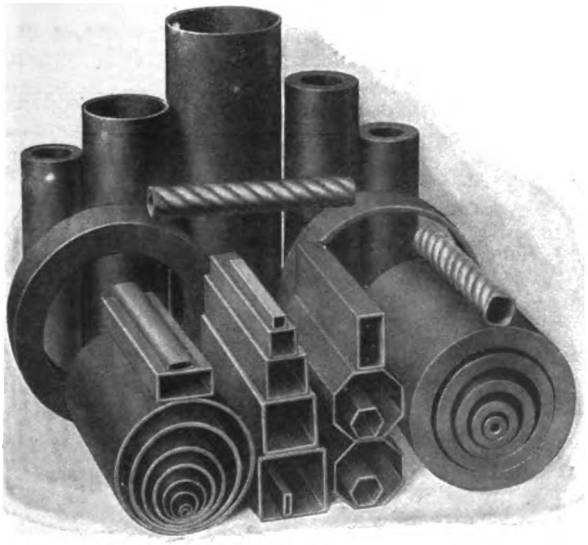

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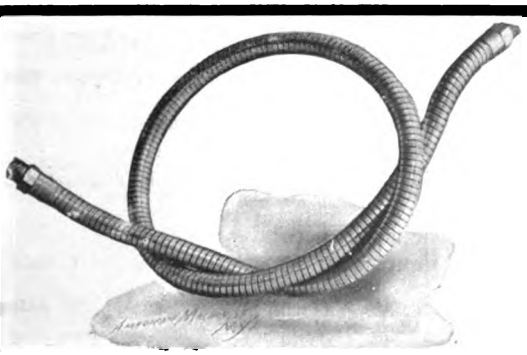

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WROUGHT TURN-BUCKLES (Continued)

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RHODE Island Tool Co., Providence, R. I.

RUSSELL, Birdsall & Ward Bolt & Nut Co., Portchester, N. Y.

WILCOX Crittenden & Co., 83 Main St., Middletown, Conn.

TURN-TABLES

AUTOMOBILE TURN-TABLES AND WHEEL TRUCKS

BICYCLE Step Ladder Co., 63 Randolph St., Chicago, Ill.

CANTON Foundry & Machine Co., Eighth & Saxon Sts., Canton, O.

ELLIOTT, Sterling, Newton, Mass.

ERNST'S Sons, C. F., Broadway & Lathrop St., Buffalo, N. Y. (See page opposite.)

FELLWOCK Automobile & Mfg. Co., 320 Upper 4th St., Evansville, Ind. "Ideal."

IDEAL—See Fellwock Automobile & Mfg. Co.

LINK Belt Co., Philadelphia, Pa.

LYON Utility Co., Rochester, N. Y.

NORTH Pennsylvania Iron Co., Philadelphia, Pa.

PITLESS Turntable Co., Kansas City, Mo.

PORTLAND Garage Co., Portland, Me. (See page opposite.)

SKINNER & Skinner, Chicago, Ill. (See page 215.)

SMITH Machine Co., H., 51 Godwin St., Paterson, N. J.

WEBER Cycle & Supply Co., 6 Kiowa St., Colorado Springs, Col.

TWINE

TUFTING TWINE

MEYER & Co., John C., Lowell, Mass.

UNIONS

PIPE UNIONS

(See Fittings, Pipe)

TUBING OR BRAZING UNIONS

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich. (See page 423.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

LUNKENHEIMER Co., 223 E. Eighth St. Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

VALVES

ANGLE, GLOBE, CHECK AND GATE VALVES

AMERICAN Valve & Meter Co., 1119 Gest St., Cincinnati, O.

BASHLIN Co., Warren, Pa.

BELFIELD & Co., H., 435 N. Broad St. Philadelphia, Pa.

BOURBON Copper & Brass Co., 618 E. Front St., Cincinnati, O.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

BURLINGTON Brass Works, Burlington, Wis.

CAPITAL Brass Works, Detroit, Mich.

CENTRAL Brass Works, 322 W. Pearl St., Cincinnati, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

CROSBY Steam Gage & Valve Co., 97 Oliver St., Boston, Mass.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

EASTWOOD Wire Mfg. Co., Belleville, N. J.

EATON, Cole & Burnham Co., 510 Main St., Bridgeport, Conn.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

JARECKI Mfg. Co., Erie, Pa.

JENKINS Bros., 71 John St., New York, N. Y.

KELLY & Jones Co., Greensburg, Pa.

KEYSTONE Brass Co., Erie, Pa.

KENNEDY Valve Mfg. Co., 57 Beekman St. New York, N. Y.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McDONALD & Morrison Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

MILWAUKEE Valve Co., 871-81 Robinson Ave., Milwaukee, Wis.

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Makes it easy to store, to exhibit, to wash, to repair and to get in and out with an automobile. We claim, and can PROVE to any Architect or Builder, Public or Private Garage that the "ERNST" Turntable is far the best in every point of comparison. Only the best materials are used and the parts are all self-contained, nothing to get out of order. All bearings are water-tight, and water can be freely used in washing or cleaning. The ball-bearings used throughout make the operation extremely easy, a mere child to turn the heaviest machine. Sold under our positive guarantee. Can be easily and inexpensively installed, even in old buildings, by any mechanic of ordinary ability. Write for full particulars and prices.

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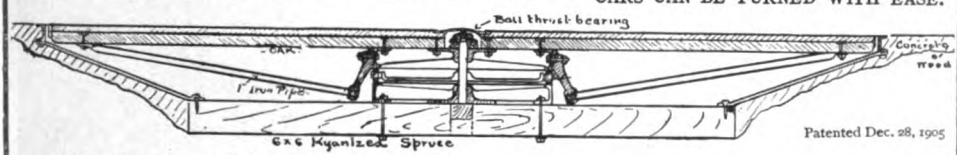

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Designed for garage and private use and is very simple and strong. All of the working parts are made of metal, the upper part, or floor, being made of wood, except when ordered of steel construction. There are two heavy cross timbers that are buried in the ground to support the iron work, and the table is hung in the middle and runs on a set of sixteen trucks that roll on the top and bottom of two castings, one bolted to the underneath side of the table and the other to the cross frame that is buried in the ground, with a thrust bearing in the center to hold the table down when running on to it. There are sixteen strutt rods to hold the table in line, and are adjustable should the table ever sag at the outer edge. It is, without doubt, the easiest moving table on the market and the heaviest machine can be turned by a child. We build an iron constructed table, with channel iron cross frame and steel top.

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VALVES (Continued)

ANGLE, GLOBE, CHECK AND GATE VALVES (Continued)

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OHIO Brass Works, Mansfield, O.

PIONEER Brass Works, 424 S. Penn St., Indianapolis, Ind.

PITTSBURG Gage & Supply Co., 309 Water St., Pittsburg, Pa.

PITTSBURG Valve, Foundry & Construction Co., 26th St. & A. Ry., Pittsburg, Pa.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

REGESTER'S Sons Co., J., Halliday & Saratoga Sts., Baltimore, Md.

SPRINGFIELD Brass Co., 126 Livingston St., Springfield, O.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

STEPHENS Mfg. Co., Roe, Detroit, Mich.

THOMAS Brass & Iron Co., Waukegan, Ill.

WALWORTH Mfg. Co., Boston, Mass. (See page 345.)

WESTERN Tube Co., Kewanee, Ill.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

BALL CHECK VALVES

CHURCHILL-LEE Co., 907-09 Michigan Ave., Detroit, Mich. (See page 151.)

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. (See page 423.)

HATCHER Auto Parts Co., 140 Viaduct, Cleveland, O.

IMPERIAL Brass Mfg. Co., 241-49 S. Jefferson St., Chicago, Ill. (See page 63.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

TURNER Brass Works, Sycamore, Ill.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

GAS ENGINE VALVES

(For Valves in the rough—See Forgings, Drop)

ELECTRIC Welding Products Co., Cleveland, O. (See page opposite.)

STANDARD Welding Co., Cleveland, O. (See page 263.)

VERSTRAETE-FYFE Mfg. Co., Burlington, Wis. (See page 59.)

GASOLINE LOCK VALVES

HILL—See Janney, Steinmetz & Co.

JANNEY, Steinmetz & Co., Fourth & Market Sts., Philadelphia, Pa. "Hill."

MARTIN—See Turner Brass Works.

TURNER Brass Works, Sycamore, Ill. "Martin."

WILLIAMS Carbureter Mfg. Co., 963 William St., Buffalo, N. Y.

GATE VALVES

(See Valves, Angle)

GLOBE VALVES

(See Valves, Angle)

MIXING VALVES

(See Vaporizers)

MUFFLER CUTOUT VALVES

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Co., Milwaukee, Wis. "Perfect." "Hux."

GRAY-HAWLEY Mfg. Co., 608 W. Fort St., Detroit, Mich. (See page opposite.)

HUX—See Garage Equipment Co.

MOTOR & Mfg. Works Co., Middle St., Geneva, N. Y.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

PERFECT—See Garage Equipment Co.

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y. (See page 180.)

S. B. R. Specialty Co., 143 W. 54th St., New York, N. Y.

SCOTT, Chas. A., 1560 Clarkson St., Denver, Col.

NEEDLE VALVES

EATON, Cole & Burnham Co., 510 Main St., Bridgeport, Conn.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave. Cincinnati, O.

TURNER Brass Works, Sycamore, Ill.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

PRESSURE REGULATING VALVES

(See Regulators, Pressure)

STEAM SAFETY VALVES

AMERICAN Steam Gauge & Valve Mfg. Co., 220 Camden St., Boston, Mass.

ASHTON Valve Co., 271 Franklin St., Boston, Mass.

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CARBON STEEL STEMS

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LONERGAN & Co., J. E., 211-13 Race St., Philadelphia, Pa.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

PITTSBURG Gage & Supply Co., 309 Water St., Pittsburg, Pa.

SCHAEFFER & Budenberg, Brooklyn, N. Y.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

STEAM THROTTLE VALVES

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2125 Spring Grove Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

TIRE VALVES

DIEN, Ch., 43-45 W. 34th St., New York, N. Y. (Importer.) "Edco."

EDCO—See Dien, Ch.

SCHRADER'S Son, A., 28-32 Rose St., New York, N. Y.

SCOVILLE Mfg. Co., 99 Mill St., Waterbury, Conn.

TIRE SAFETY VALVES

ARNOLD—See Tire Safety Device Co.

ARTIZAN Brass Co., 204 Lincoln Park Blvd., Chicago, Ill. "Savety."

BELL—See Turner Brass Works.

FAIRES & Luppert, Williamsport, Pa.

LOCK Switch Mfg. Co., New York, N. Y.

NOBLO Co., 123 Westminster St., Springfield, Mass.

SAVETY—See Artizan Brass Co.

TIRE Safety Device Co., 208 W. 124tn St., New York, N. Y. "Arnold."

TURNER Brass Works, Sycamore, Ill. "Bell."

VANADIUM

AMERICAN Vanadium Co., Frick Bldg., Pittsburg, Pa.

VANADIUM Alloys Co., 25 Broad St., New York, N. Y.

VAPORIZERS

GASOLINE VAPORIZERS OR MIXING VALVES

ACME—See Essex Brass Co.

BARKER, C. L., Norwalk, Conn.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. "Acme." (See page 423.)

GENERATOR Valve Co., 294-96 Taaffe Place, Brooklyn, N. Y.

LAVIGNE Mfg. Co., 608 Commonwealth St., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

MONARCH Valve Co., 112 Front St., Brooklyn, N. Y.

NONPAREIL—See Lunkenheimer Co.

VARNISHES

ACME White Lead & Color Works, Detroit, Mich.

ANGLO-AMERICAN Varnish Co., 53-63 Johnson St., Newark, N. J.

ARMITAGE & Co., John L., Newark, N. J.

ATLANTIC Drier & Varnish Co., Philadelphia, Pa.

BABCOCK Varnish Co., 60 Pearl St., Boston, Mass.

BECKWITH-CHANDLER Co., 201 Emmett St., Newark, N. J.

BERRY Bros., Leib & Wight Sts., Detroit, Mich.

BILLINGS-CHAPIN Co., Cleveland, O.

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUCKEYE Paint & Varnish Co., Toledo, O.

CALMAN, Emil, 100 William St., New York, N. Y.

CHASE, Roberts & Co., 5th St. & West Ave., Long Island City, N. Y.

CHICAGO Varnish Co., Dearborn Ave. & Kenzie St., Chicago, Ill.

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

CINCINNATI Varnish Co., 218 E. Court St., Cincinnati, O.

CLEVELAND Varnish Co., 3111 E. 87th St., Cleveland, O.

COLUMBUS Varnish Co., Columbus, O.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DEVOE & C. T. Reynolds Co., F. W., 103 Fulton St., New York, N. Y.

ELMENDORF Varnish Co., 36 Larrabee St., Chicago, Ill.

FELTON, Sibley & Co., 136-140 No. 4th St., Philadelphia, Pa.

FLINT Varnish Works, Flint, Mich.

FLOOD & Conklin Co., 136 Chestnut St., Newark, N. J.

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VARNISHES

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MANUFACTURED BY

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NEW YORK

CHICAGO - ST. LOUIS - MINNEAPOLIS

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FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GILLESPIE & Sons, Chas. H., 125 Dey St., Jersey City, N. J.

GLIDDEN Varnish Co., Rockefeller Bldg., Cleveland, O.

GRAVES Co., N. Z., Philadelphia, Pa.

HILDRETH Varnish Co., 90 West St., N. Y. City.

HOPKINS Varnish Co., 85-91 Vesey St., Newark, N. J.
(See page opposite.)

JOHNSTON Paint Co., 226 Main St., Cincinnati, O.

LUCAS & Co., John, Race & 4th Sts., Philadelphia, Pa.

McDOUGALL Varnish Co., Buffalo, N. Y.

MASURY & Son, John W., New York, N. Y.
(See page 289.)

MINETT Varnish Co., 165 Broadway, New York, N. Y.

MITCHELL-MALLON Co., 317-19 N. J. R. R. Ave., Newark, N. J.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOUND City Paint & Color Co., 811-13 N. Sixth St., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NICE, Eugene E., 272-74 S. Second St., Philadelphia, Pa.

NOAKE-WHEELER-CLOUGH Co., 377 Illinois St., Chicago, Ill.

PARROTT Varnish Co., Bridgeport, Conn.

PAYSON Varnish Co., 141st St. & Walnut Ave., New York City.

PRATT & Lambert, Buffalo, N. Y.

QUEEN City Varnish Co., Cincinnati, O.

SCHRACK & Co., C., 152 No. 4th St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, 45 Broadway, N. Y. City.

STANDARD Varnish Works, 29 Broadway, New York, N. Y.

STEWART-MOWHY Co., 3214 Shields Ave., Chicago, Ill.

VALENTINE & Co., New York, N. Y.
(See page opposite.)

VOLTMETERS

(See Ammeters; also Gauges, Battery)

VULCANIZERS

TIRE VULCANIZERS

AKRON-WILLIAMS—See Williams Foundry & Machine Co.

ATLAS Rubber Co., Buffalo, N. Y.
(See page 271.)

AUTO Improvement Co., 316 Hudson St., New York, N. Y. "Ever Ready."

AUTO Specialty Co., 330 N. Illinois St., Indianapolis, Ind. "Marble."

AUTO-TIRE Vulcanizing Co., Lowell, Mass.
(See page 38.)

BEAN Son Co., Cleveland, O. "Empire."
(See page 63.)

BIGGS Boiler Works Co., Akron, O.

COMBINATION Steam Vulcanizer Co., 304 E. 48th St., Minneapolis, Minn.

CORP Bros., 38-40 Mathewson St., Providence, R. I.

ELECTRICAL Vulcanizer Co., Corn Exchange Bldg., Minneapolis, Minn.
(See page 175.)

EMPIRE—See Bean Son Co.

EVER READY—See Auto Improvement Co.

EXCELSIOR—See Wishart-Burge Machine Works.

GIBNEY & Bro., Jas. L., 211-13 N. Broad St., Philadelphia, Pa.

GOODRICH Co., B. F., Akron, O.

LITTLE WONDER—See Rice Mfg. Co.

MARBLE—See Auto Specialty Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

OGDEN, D., 332 Fifth St., Columbus, Ind.

O'NEILL Tire & Protector Co., Buchtel Ave. Akron, O.

RICE & DAYTON Mfg. Co., Cedar Falls, Ia. "Little Wonder."

SHALER Co., C. A., Waupun, Wis.
(See page 429.)

STITCH in Time Vulcanizer Co., 919 Kansas Ave., Topeka, Kan.

WILLIAMS Foundry & Machine Co., Akron O. "Akron-Williams."

WISHART-BURGE Machine Works, 58-60 N. Jefferson St., Chicago, Ill. "Excelsior."

WARMERS

FOOT WARMERS

(See Heaters, Automobile)

WASHERS

FELT WASHERS

BOOTH, N. E., 743-45 39th St., Brooklyn, N. Y.
(See page 393.)

BOWEN Mfg. Co., 16 Canal St., Auburn N. Y.

IRON AND STEEL WASHERS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

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AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

CLARK Bros. Bolt Co., Milldale, Conn.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corporation, New Britain, Conn.

CROSBY Co., Buffalo, N. Y. (See page 249.)

FALLS Rivet & Machine Co., Cuyahoga Falls, O.

KANSAS City Bolt & Nut Co., Kansas City, Mo.

KRIPPS-MASON Machine Co., 1636 N. Hutchison St., Philadelphia, Pa.

McKINNEY Mfg. Co., Allegheny, Pa.

MICHIGAN Bolt & Nut Works, foot of Meldrum Ave., Detroit, Mich.

NEW England Bolt & Nut Co., 267 Atlantic Ave., Boston, Mass.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

QUADRIGA Mfg. Co., 16-18 S. Canal St., Chicago, Ill.

REPUBLIC Iron & Steel Co., Frick Bldg. Annex, Pittsburg, Pa.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

SCRANTON Bolt & Nut Co., Scranton, Pa.

STANLEY Works, Lake St., New Britain, Conn.

STERLING Machine & Stamping Co., Vermillion, O. (See page 459.)

TAUNTON Rivet Co., Taunton, Mass.

UNION Nut & Bolt Co., Unionville, Conn.

WROUGHT Washer Mfg. Co., Milwaukee, Wis.

LEATHER WASHERS

CHICAGO Rawhide Co., 75-77 Ohio St., Chicago, Ill.

CLIMAX Specialty Co., Seneca Falls, N. Y.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

GRATON & Knight Mfg. Co., 94-104 Bloomingdale Road, Worcester, Mass. (See page 271.)

LEATHER & Brass Mfg. Co., Auburn, N. Y.

PICROME Hide Co., Cor. N. Salina & Turtle Sts., Syracuse, N. Y. (See page 411.)

STANDARD Leather Washer Mfg. Co., 24-26 Boudinot St., Newark, N. J.

WOLVERINE Leather Goods Co., 59 E. Fort St., Detroit, Mich.

LOCK WASHERS

(See Nuts, Lock)

STEEL SPRING WASHERS

BARNES Co., Wallace, Bristol, Conn. (See page 421.)

HOBBS Mfg. Co., Worcester, Mass. (See page 445.)

VEHICLE WASHERS

ARDREY Vehicle Washer Co., Rochester, N. Y.

CATARACT Auto-Vehicle Washer Co., Topeka, Kans. (See page opposite.)

DE LUXE—See Frey, John W.

ECONOMY Vehicle Washer Co., Newburg, N. Y.

FOREMAN Patent Swinging Hose Bracket Co., L. T., 317 S. 12th St., Omaha, Neb.

FREY, John W., Buffalo, N. Y. "De Luxe."

IDEAL Carriage Washer Co., 383 Main St. E., Rochester, N. Y.

IRVING—See Smith Mfg. Co.

LONG & Mann Co., 527 Graves St., Rochester, N. Y.

NICHOLSON Mfg. Co., H., 68 Dey St., N. Y City.

PERFECTION—See Ryan & Long.

RYAN & Long, 586 Oneida St., Appleton Wis. "Perfection." (See page 457.)

SMITH Mfg. Co., I. J., 236 W. 41st St., New York, N. Y. "Irving."

STAR Brass Works, 12-14 S. Jefferson St Chicago, Ill.

VEHICLE Specialtiy Mfg. Co., 27 State St., Hartford, Conn. (See page opposite.)

WASTE

COTTON WASTE

BISHOP Mfg. Co., Robert (S. Boston Boston, Mass.

BLAKELEY & Son, John, 1089 Germantown Ave., Philadelphia, Pa.

DORCHESTER Waste Co., 1210 Dorchester Ave., Boston, Mass.

EGAN & Co., K., New York, N. Y.

FIDELITY—See Hagy Waste Works.

FOWLER Waste Mfg. Co., Philadelphia, P

HAGY & Son, Clayton L., 16th & Carpenter Sts., Philadelphia, Pa.

HAGY Waste Works, J. Milton, 433 Spruce St., Philadelphia, Pa. "Fidelity."

HOFFMAN-CORR Mfg. Co., 55-57 White St., New York, N. Y. (See page opposite.)

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

LILLIE Co., Dexter P., Indian Orchard Mass.

MASSASOIT Mfg. Co., Fall River, Mass.

OLMSTED & Tuttle Co., Chicopee, Mass.

RIVERSIDE Mills, Augusta, Ga.

SOUTH Atlantic Waste Co., Charlotte, N.

SPRINGFIELD Waste Co., Springfield, Mass

STANDARD Waste Mfg. Co., 2306-10 American St., Philadelphia, Pa.

Complete Index to Classification appears on Pages 7 to 18.

THE WASTE THAT SAVES

Lion Mills Brand Cotton Waste

Excel	White	Waste	Clyde	Colored	Waste
Antrim	"	"	Valto	"	"
Oceanic	"	"	Ashland	"	"
Extra	"	"	Warwick	"	"
No. 1	"	"	Sun	"	"
Tunis	"	"	Empire	"	"
Beach	"	"	Waba	"	"
Vaga	"	"			

Packed in bales weighing 10, 25, 50, 125 or 500 lbs. each

HOFFMAN-CORR MFG. CO.

55-57 WHITE STREET NEW YORK

THE CATARACT AUTO-VEHICLE WASHER

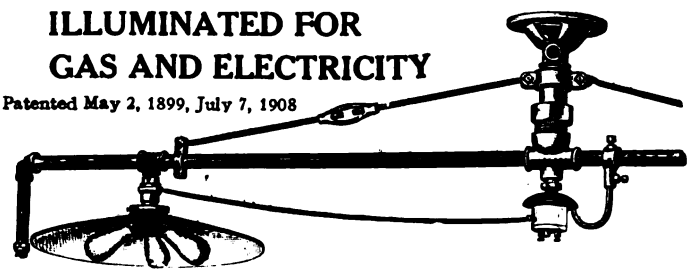
Cleanses Automobiles, Carriages, Hacks, Delivery Wagons—and, in fact, all vehicles that must be kept clean. It is composed of a brass tube, with perforated brass bulb on the end and a soft cotton mop attached, through which the water pours when connected with a hose. Wanted, agents and dealers to handle it everywhere. Everybody will buy one.

CATARACT AUTO-VEHICLE WASHER CO., Topeka, Kansas Box 116

OVERHEAD VEHICLE WASHERS

ILLUMINATED FOR GAS AND ELECTRICITY

Patented May 2, 1899, July 7, 1908



This cut is from a photograph of our latest improved washer and illustrates the heavy and substantial construction of the cast brass head.

The only *illuminated washer* on the market and the *best* made.

For night use or in a dark place it is the ideal machine.

Our Plain Washer is the strongest and best made of its kind and therefore the most economical one to buy.

A NECESSITY FOR ALL OWNERS OF AUTOMOBILES

SAVES TIME LABOR MONEY

NO GRIT on your hose to ruin your fine machine.
NO LONG HOSE to drag around.
A STRONG LIGHT thrown just where you want it.

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Regular finish is red enameled, but we furnish also in polished or nickel plated brass. Write for prices and discounts.

VEHICLE SPECIALTY MFG. CO.

27 State Street Hartford, Conn.

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WELDING

AUTOGENOUS WELDING

CROSBY Co., Buffalo, N. Y. (See page 249.)

DAVIS-BOURNONVILLE Co., West St. Bldg., New York, N. Y.

INDUSTRIAL Oxygen Co., Hanover Bank Bldg., New York, N. Y.

LINDE Air Products Co., 160 Chandler St., Buffalo, N. Y.

NATIONAL Welding & Mfg. Co., 1422-30 Niagara St., Buffalo, N. Y. (See page 331.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

ELECTRIC WELDING

ELECTRIC Welding Products Co., Cleveland, O. (See page 287.)

SPARKS - WITHINGTON Co., Jackson, Mich. (See page 499.)

STANDARD Welding Co., Cleveland, O. (See page 263.)

WHEELS

SPECIAL PNEUMATIC, SPRING AND EMERGENCY WHEELS

AMERICAN Pneumatic Hub Wheel Co., National Metropolitan Bank Bldg., Washington, D. C. "Collins-Akehurst."

AMERICAN Resilient Wheel Co., 1336 New York Ave., Washington, D. C.

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich. "Detroit." (See page 307.)

ARCHER Motor Tire Co., Marion, O.

AUTOMOBILE Wheel & Rim Co., Northwestern Bldg., Minneapolis, Minn.

BLACK Mfg. Co., Fort Wayne, Ind.

BURROWES Co., E. T., Portland, Me. (See page 277.)

COLLINS-AKEHURST—See American Pneumatic Hub Wheel Co.

DE JARNETTE—See Eby Mfg. Co.

DETROIT—See Anderson Forge & Machine Co.

EBY Mfg. Co., York, Neb. "DeJarnette."

FLEXIBLE Tire Co., 310 Main St., Springfield, Mass.

IRON Tire Pneumatic Wheel Co., 251 Fifth Ave., New York, N. Y.

LEA, E. S., Lamberton & Lalor Sts., Trenton, N. J.

NELSON Wheel Co., 141-43 E. Ontario St., Chicago, Ill.

PULLWIN Wheel Co., 37 Colony St., Meriden, Conn.

RUTHERFORD Pneumatic Wheel Co., Stamford, Conn.

SCHNEIDER Mfg. Co., 42 Broadway, New York, N. Y.

SPARE Motor Wheel of America, Harvester Bldg., Chicago, Ill. "Stepney." (See page opposite.)

STEPNEY—See Spare Motor Wheel Co.

STEEL DISC WHEELS

INDESTRUCTIBLE Steel Wheel Co., 1221 Michigan Ave., Chicago, Ill. (See page 447.)

STEERING WHEELS

BRISCOE Mfg. Co., Detroit, Mich., & Newark, N. J. (See page 109.)

BRYANT & Berry Co., 34 W. Atwater St. Detroit, Mich.

BYRNE, Kingston & Co., Kokomo, Ind. (See page 71.)

CENTAUR Motor Co., 59 Franklin St., Buffalo, N. Y.

COLEMAN, J. C., 58-60 First St., Detroit, Mich.

DETROIT Steering Wheel Co., 274-88 Wight St., Detroit, Mich. (See page opposite.)

GOERSS, Herman, 162 Russell Ave., Cleveland, O.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

TUBULAR STEEL WHEELS

STANDARD Welding Co., Cleveland, O. (See page 263.)

WIRE WHEELS

JAMESVILLE Mfg. Co., Jamesville, N. Y.

MOTT Wheel Works, Pleasant St., Utica, N. Y.

STE-EL-ASTIC—See Whiteside Wheel Co.

WHITESIDE Wheel Co., Canal & W. 10th Sts., Indianapolis, Ind. "Ste-el-astic."

WOOD WHEELS

ARCHIBALD Wheel Co., 150 West St., Lawrence, Mass.

EAMES & Co., A. M., S. Framingham, Mass.

EMPIRE Wheel Works, 174 South St., Utica, N. Y.

HAGERSTOWN Spoke & Bending Co., Walnut & Church Sts., Hagerstown, Md.

HAYES Wheel Co., Jackson, Mich. (See page 407.)

HOOPES Bros. & Darlington, West Chester, Pa.

IMPERIAL Wheel Co., Flint, Mich.

JAMESVILLE Mfg. Co., Jamesville, N. Y.

JONES & Co., Phineas, Newark, N. J. (See page 447.)

MEEKER Mfg. Co., Linden & Hoffman Sts., Dayton, O.

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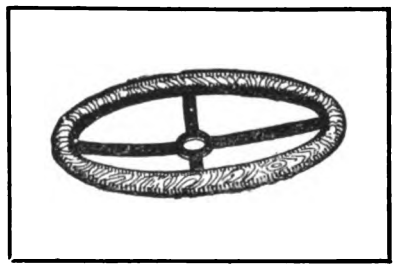
STEERING WHEELS

One Piece Bent Maple In any Finish

MANUFACTURERS—let us be your Steering Wheel Manufacturing Department. We have a capacity to build 100,000 wheels annually, and can guarantee prompt deliveries.

Manufacturing Steering Wheels exclusively, we do this one thing well. The quality of material and workmanship is the highest grade possible to be obtained anywhere, and our prices are no higher than for wheels of questionable reliability.



Write to us—see if we don't make you a satisfactory proposition.

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OFFICE AND FACTORY **274-288 Wight St., DETROIT, MICHIGAN**

The STEPNEY SPARE WHEEL

owner has a positive feeling of security and knows that if a tire bursts or a blow-out occurs, neither he nor his guests in the car will suffer inconvenience or delay, for if anything of the kind does happen, it is merely necessary for the driver to step from the car, snap on a Stepney and he is on his way in less than one minute.

50,000 in use in England and on the Continent. It is part of the equipment of every Taxicab in London, Paris, Berlin and New York. 17,000 sold in one month in America.

Send for descriptive Catalogue.

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NEW YORK OFFICE: 2148 Broadway

WHEELS (Continued)

WOOD WHEELS (Continued)

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MUTUAL Wheel Co., 709 Third Ave., Moline, Ill.

NEW Haven Carriage Co., Water & Franklin Sts., New Haven, Conn.

PRUDDEN & Co., W. K., Lansing, Mich.

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 407.)

SCHWARZ Wheel Co., Glenwood Ave., above 20th St., Philadelphia, Pa.

SENDELBACH Wheel Co., East St. Louis, Ill.

SHORTSVILLE Wheel Co., Shortsville, N. Y.

UNION City Wheel Co., Union City, Ind.

WAPAKONETA Wheel Co., Wapakoneta, O.

WHEEL & Wood Bending Co., 141 John St. Bridgeport, Conn.

ZWICK & Greenwald Wheel Co., Linden & Hoffman Sts., Dayton, O.

WHIPCORD

UPHOLSTERY WHIPCORD

LAIDLAW, Jr., W. R.., 244-50 W. 49th St., New York, N. Y.
(See page 471.)

ROY Woolen Co., Watervliet, N. Y.

WATERLOO Woolen Co., Waterloo, N. Y.

WHISTLES

EXHAUST WHISTLES

(See Horns, Exhaust)

WICKING

CANDLE WICKING

BISHOP Mfg. Co., Robert (S. Boston), Boston, Mass.

COLLINS, G. S., Central Village, Conn.

ESTES Mills, Fall River, Mass.

FLETCHER Mfg. Co., 72 Leonard St., New York, N. Y.

HOFFMAN-CORR Mfg. Co., 55-57 White St., New York, N. Y.
(See page 293.)

HOOPER & Sons, Wm. E., Maryland Life Bldg., Baltimore, Md.

LEES Mfg. Co., 320 Broadway, New York, N. Y.

WESTPORT Mfg. Co., Fall River, Mass.

WICKS

LAMP WICKS

ANSONIA Co., O. & C., Ansonia, Conn.

CONSOLIDATED Cotton Duck Co., Conti nental Trust Bldg., Baltimore, Md.

FLETCHER Mfg. Co., 72 Leonard St., Ne York, N. Y.

HOOPER & Sons, Wm. E., Maryland Li Bldg., Baltimore, Md.

LEES Mfg. Co., 320 Broadway, New Yor N. Y.

NEW Jersey Wick Co., Newark, N. J.

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INSULATED WIRE

AMERICAN Electrical Works, Provide R. I.

AMERICAN Steel & Wire Co., The Rook Chicago, Ill.

ATLANTIC Insulated Wire & Cable Co., Liberty St., New York, N. Y.

B. I. W.—See Boston Insulated Wire Co.

BISHOP Gutta-Percha Co., 426 E. 2 St., New York, N. Y.
(See page opposite.)

BOSTON Insulated Wire & Cable Co., Freeport St., Boston, Mass. "B. I. W."

BOURN Rubber Co., Providence, R. I.

BRIXEY, W. R., 203 Broadway, New Y N. Y.

CHAMPION Co., Albert, 38 Whittier Boston, Mass. (Importers.)
(See page 413.)

EASTERN Electric Cable Co., 61-63 H shire St., Boston, Mass.

EMPIRE Automobile Tire Co., Mulberr & Clinton Ave., Trenton, N. J.

GENERAL Electric Co., Schenectady, N

HAZARD Mfg. Co., Wilkesbarre, Pa.

INDIA Rubber & Gutta Percha Insu Co., 253 Broadway, New York, N. Y.

INDIANA Rubber and Insulated Wir Jonesboro, Ind.

MOTOR Car Equipment Co., 55 Ws St., New York, N. Y. (Impor "Pirelli."
(See page 179.)

NATIONAL India Rubber Co., Bristol,

NEW YORK Insulated Wire Co., 114 L St., New York, N. Y.

OKONITE Co., 253 Broadway, New N. Y.

PACKARD Electric Co., Warren, O
(See page opposite.)

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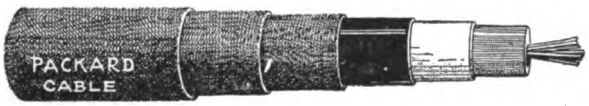
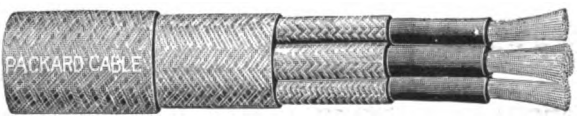
Packard Enameled Ignition Cable



Is the earmark of a **high-class, reliable outfit,** whether automobile or motor-boat. Please observe this fact.

Absolutely **heat, grease, oil** and **moisture** proof.



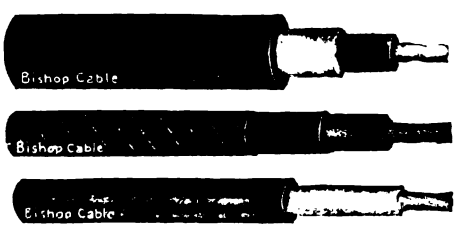
Our multiple strand low tension cable makes a very neat appearance and at the same time offers **double** protection.

THE PACKARD ELECTRIC CO., Warren, O.

Bishop Ignition Cable

Will give you less trouble and better service than any other cable. From start to finish it is of the highest possible quality. Highest conductivity—best Para rubber insulation —extreme flexibility.

Every Foot Tested and Guaranteed.



The largest variety of Ignition Cable manufactured by any one company. The wonderful durability of Bishop Cable and its ability to "stand up" under any and all conditions make it the most economical cable you can buy. Samples and prices to the trade upon application.

BISHOP GUTTA-PERCHA CO.,

426 East 25th Street, New York.

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WIRE (Continued)

INSULATED WIRE (Continued)

PIRELLI—See Motor Car Equipment Co.

PNEU l'Electric Co., 1610 Broadway, New York, N. Y. (Importers.) (See page 269.)

SAFETY Insulated Wire & Cable Co., 114 Liberty St., New York, N. Y. (See page 299.)

SIMPLEX Electrical Co., 110 State St., Boston, Mass.

STANDARD Underground Cable Co., Westinghouse Bldg., Pittsburg, Pa.

PHOSPHOR BRONZE WIRE

ELEPHANT—See Phosphor Bronze Smelting Co.

PHOSPHOR Bronze Smelting Co., 2206 Washington Ave., Philadelphia, Pa. "Elephant." (See page 453.)

RIVERSIDE Metal Co., Riverside, N. J.

STEEL SPRING WIRE

ACME Wire Co., Cuyahoga Falls, O.

AMERICAN Steel & Wire Co., The Rookery, Chicago, Ill.

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

KIDD Bros. & Burgher Steel Wire Co., Alliquippa, Pa.

ROEBLING'S Sons Co., John A., Trenton, N. J.

SPENCER Wire Co., Worcester, Mass.

TRENTON Iron Co., Trenton, N. J.

WOOL

STEEL WOOL

AMERICAN Steel Wool Mfg. Co., 451 Greenwich St., New York, N. Y. (See page opposite.)

BUEHNE Steel Wool Co., 93 Nassau St., New York, N. Y.

WRENCHES

VALVE PLUNGER WRENCHES

(For taking Plungers out of Tire Valves)

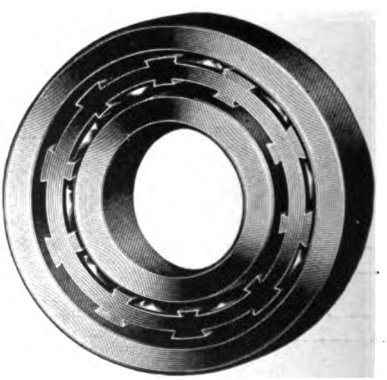
CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

B. K. F. BALL BEARINGS

MADE IN GERMANY

A LITTLE BETTER THAN THE BEST. ASK FOR THEM, USE THEM ONCE AND YOU WILL USE NO OTHERS

Note the deep tracks in the races, the one-piece ball retainer, no screws, no rivets, and the bearings are not twisted or strained to insert balls. 92 per cent. balls; no machining necessary, only forging and grinding.



Made by the new and patented forging and rolling system, which renders the races more tough and tensile. They are now all the rage abroad and those that adopt them here do not ask for others. They can be produced better and at a lower figure than any other Ball Bearing on the market.

MERCEDES MOTOR MFG. CO. NEW KENSINGTON, PA.

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SAFETY

Primary and Secondary Ignition Cables

are designed and manufactured to insure continuous service under all conditions. Only the highest grade materials are used, and their construction renders them WATER, OIL, GREASE and DUST PROOF.

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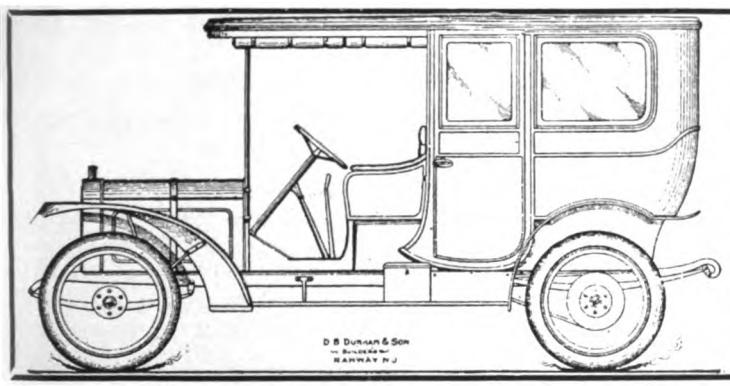

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is superior to Sandpaper and other abrasives and does the work in 1-3 the time with better results

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COLUMBUS Forge & Iron Co., Columbus, O. "Trenton."

EAGLE—See Fisher & Norris.

FISHER & Norris, Trenton, N. J. "Eagle."

HAY-BUDDEN Mfg. Co., Brooklyn, N. Y.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

PETER WRIGHT—See Wiebusch & Hilger.

TRENTON—See Columbus Forge & Iron Co.

WIEBUSCH & Hilger, New York, N. Y. (Importers.) "Peter Wright."

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BAIRD Machine Co., Oakville, Conn.

BARNETT Foundry Co., Oscar, Newark, N. J.

BYRAM & Co., Detroit, Mich.

CLEVELAND Tumbling Barrel & Mfg. Co., Cleveland, O.

GILMOUR, J., New York, N. Y.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 407.)

HENDERSON Bros., Waterbury, Conn.

PERKINS Co., Henry, Bridgewater, Mass.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

STANDARD Machinery Co., Providence, R. I.

STOVER Mfg. Co., Freeport, Ill.

WATERBURY Machine Co., Waterbury, Conn.

WHITING Foundry Equipment Co., Harvey, Ill.

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BORING BARS

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CARR Bros., Syracuse, N. Y.

CELFOR Tool Co., Chicago, Ill. "Rich."

HILL Standard Mfg. Co., Anderson, Ind.

KRIEGER Tool & Mfg. Co., Chicago, Ill.

O. K. Tool Holder Co., Shelton, Conn.

RICH—See Celfor Tool Co.

UNDERWOOD & Co., H. B., Philadelphia, Pa.

BASKETS

DIPPING BASKETS

SMITH & Co., Edward F., New Haven, Conn.

WISCONSIN Wire & Iron Works, Milwaukee, Wis.

WRIGHT Wire Co., Worcester, Mass.

BELLOWS

HAND BELLOWS

(Blacksmiths and Molders)

BRAND & Co., S. H., Chicago, Ill.

CHRISTEN & Sons, F., St. Louis, Mo.

DOBSON, Wm., Canastota, N. Y.

KEESE, Chas. H., New York, N. Y.

OSBORN Mfg. Co., Cleveland, O.
(See page 305.)

PARO, Edward, Chicago, Ill.

SHANAFELT Mfg. Co., Canton, O.

WOODASON, Thos., Philadelphia, Pa.

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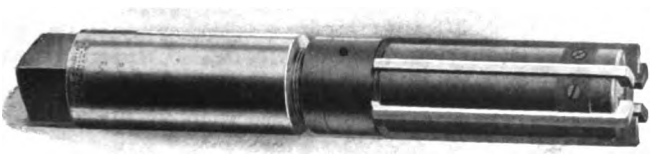
ENGLISH and METRIC



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ALL KINDS AND SIZES FOR AUTOMOBILE WORK.

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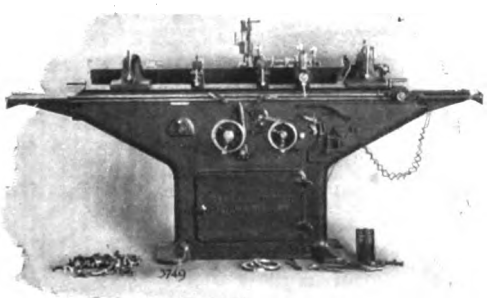


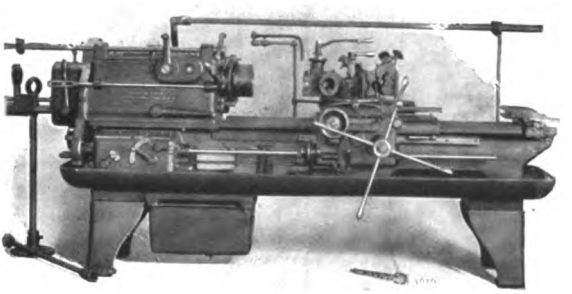
Automatic Sizing Grinder

The heavy coarse feed is automatically changed to a fine feed and work is quickly ground with a fine finish to exact size without calipering

2½ x 26 Open Turret Lathe

with cross-sliding turret.

30% heavier than any turret lathe of its size. Rigid backing for tools as well as a solid seat.



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Write for Catalogues of Machines in which you are interested.

PRATT & WHITNEY CO., Hartford, Conn.

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(Hand Power)

ESTEP & Dolan, Sandwich, Ill.

WALLACE Supply Co., Chicago, Ill.

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AUGER BITS

AMERICAN Auger Bit Co., Forestville, Conn.

BAILEY—See Ohio Tool Co.

BROWN & Co., R. H., New Haven, Conn. "Clark's."

CHESTER Mfg. Co., Chester, Conn.

CLARK'S—See Brown & Co.

CONNECTICUT Valley Mfg. Co., Centerbrook, Conn.

DEUSE, J. S., Chester, Conn.

FERGUSON & Co., J. R., Chester, Conn.

FORSTNER—See Progressive Mfg. Co.

GREENLEE Bros. & Co., Chicago, Ill.

HUMPHREYSVILLE Mfg. Co., Seymour, Conn.

IRWIN Auger Bit Co., Wilmington, O.

IVES Mfg. Co., W. A., Wallingford, Conn. "Red Devil."

JENNINGS & Co., C. E., New York, N. Y.

KILBORN & Bishop Co., New Haven, Conn.

OHIO Tool Co., Columbus, O. "Bailey."

PROGRESSIVE Mfg. Co., Torrington, Conn. "Forstner."

RED DEVIL—See Ives Mfg. Co.

RUSSELL-JENNINGS Mfg. Co., Chester, Conn.

SNELL Mfg. Co., Fiskdale, Mass.

SWAN Co., Jas., Seymour, Conn.

BLADES

HACK SAW BLADES

(For Hack Saw Frames—See Frames, Hack Saw)

A. A. A.—See Atkins & Co.

ATHOL Machine Co., Athol, Mass.

ATKINS & Co., E. C., Indianapolis, Ind. "A. A. A."

BAY STATE—See Simonds Mfg. Co.

CHROMOL—See Disston & Sons.

CULLEY—See Simonds Mfg. Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DISSTON & Sons, Henry, Philadelphia, Pa. "Keystone," "Chromol."

EUREKA-YANKEE—See Thompson & Son Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIFFIN & Co., G. W., Franklin, N. H.

KEYSTONE—See Disston & Sons.

MASSACHUSETTS Saw Works, Chicopee, Mass. "Victor."

MILFORD—See Thompson & Son Co.

MILLERS Falls Co., 30 Warren St., New York, N. Y.
(See page 361.)

NATIONAL—See Whitaker Mfg. Co.

SIMONDS Mfg. Co., Fitchburg, Mass. "Bay State," "Culley."

STAPF & Co., John B., Dunkirk, N. Y.

STAR—See Millers Falls Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Diamond Saw & Stamping Works.

T. T.—See Thompson & Son Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Milford," "Eureka-Yankee," "XL," "TT."

UNIVERSAL—See West Haven Mfg. Co.

UNION Hardware Co., Torrington, Conn.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

XL—See Thompson & Son Co.

WEST Haven Mfg. Co., New Haven Conn. "Universal," "Utility."

WHITAKER Mfg. Co., Chicago, Ill. "National."
(See page 377.)

BLOCKS

CHAIN BLOCKS

(See Cranes, Portable)

BLOWERS

PRESSURE BLOWERS

AMERICAN Blower Co., Detroit, Mich.

BUFFALO Forge Co., Buffalo, N. Y.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief."

HARTFORD Blower Co., Hartford, Conn.

NATIONAL Blower Works, Milwaukee, Wis.

NEW York Blower Co., Chicago, Ill.

ROOTS Co., P. H. & F. M., Connersville, Ind.

ROYAL—See Canedy-Otto Mfg. Co.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILBRAHAM-GREEN Blower Co., Pottstown, Pa.

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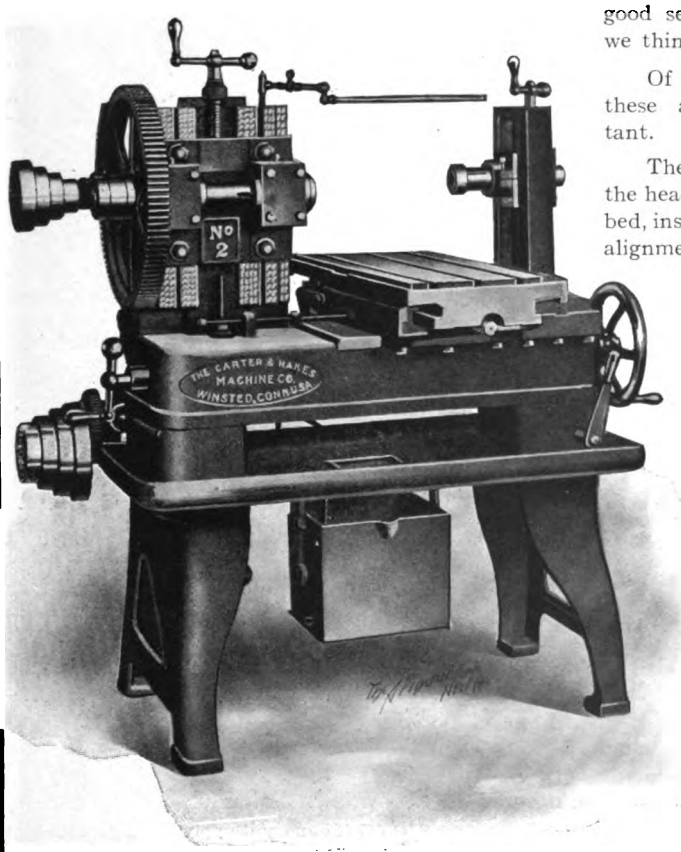
Better the quality of your work — Increase your output and profits by using

IMPROVED

LINCOLN MILLING MACHINES

For Milling Parts for Automobiles

To manufacturers who are familiar with the Lincoln type of milling machines for manufacturing purposes, a description of this machine is hardly necessary, and to those who are not, we will simply say that for the purpose for which this machine is designed, we believe that we have an A-1 Machine, one which will give you good service, and one which we think will please you.



Of its many good features these are especially important.

The upright which holds the head is cast solid with the bed, insuring rigidity and close alignment of the head.

Large table with ample bearing and support in the saddle.

Patent Automatic Quick Return for the table, which is a time and labor saver, and is a feature exclusive to our machines.

At present we have a few of these machines in stock and can make prompt delivery. Why not try them for milling some of your parts for Automobiles.

Circular Giving Full Description Sent Upon Request.

THE CARTER & HAKES MACHINE CO.

WINSTED, CONN., U. S. A.

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BOBS

PLUMB BOBS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

DISSTON Sons, Henry, Philadelphia, Pa.

PECK, Stow & Wilcox Co., Southington, Conn.

READING Hardware Co., Reading, Pa.

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

WELCH & Co., Thomas F., Boston, Mass.

BOXES

ANNEALING AND CASE HARDENING BOXES

LEETONIA Boiler Co., Leetonia, O.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NATIONAL Mfg. Co., Pittsburg, Pa.

NATIONAL Wrought Iron Annealing Box Co., Anderson, Ind.

REEVES Bros. Co., Alliance, O.

RITER-CONLEY Mfg. Co., Pittsburg, Pa.

WARREN City Boiler Works, Warren, O.

WILFONG Bros., Philadelphia, Pa.

MITRE BOXES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "Dorn's."

DORN'S—See Braunsdorf-Mueller Co.

GOODELL Mfg. Co., Greenfield, Mass.

LANGDON—See Millers Falls Co.

MARSH Co., H. C., Rockford, Ill.

MILLER Falls Co., 30 Warren St., New York, N. Y. "Langdon." (See page 361.)

NICHOLLS Mfg. Co., Ottumwa, Ia.

PERFECTION—See Tower & Lyon Co.

SHELDON & Co., E. H., Chicago, Ill.

STANLEY Rule & Level Co., New Britain, Conn.

TOWER & Lyon Co., New York, N. Y. "Perfection."

SHEET METAL TOTE BOXES

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, Ohio.

FEDERAL Steel Fixture Co., Chicago, Ill.

KILBOURNE & Jacobs Mfg. Co., Columbus, Ohio.

LYON Metallic Mfg. Co., Aurora, Ill.

OHIO Mfg. Co., Painesville, O.

TERRELLS Equipment Co., Grand Rapids, Mich.

BRACES

BIT BRACES

AMERICAN—See Turner & Deegan.

BARBER—See Miller Falls Co.

BARBERS—See Turner & Deegan.

CHANTRELL Tool Co., Reading, Pa.

E. S. BRACE Co., Niagara Falls, N. Y.

FRAY & Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

IVES Mfg. Co., W. A., Wallingford, Conn.

LANCASTER Machine & Knife Works, Lancaster, N. Y.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MILLER Falls Co., 30 Warren St., New York, N. Y. "Barber." (See page 361.)

PECK, Stow & Wilcox Co., Southington, Conn.

SMITH Co., J. Barton, Philadelphia, Pa.

STANLEY Rule & Level Co., New Britain, Conn.

STORTZ & Son, John, Philadelphia, Pa.

TURNER & Deegan, Bristol, Conn. "American," "Barbers."

BRUSHES

FOUNDRY AND SHOP BRUSHES

BRAND & Co., S. H., Chicago, Ill.

BROMWELL Brush & Wire Goods Co., Cincinnati, O.

CINCINNATI Mfg. Co., Cincinnati, O.

FLINT, Warren F., Boston, Mass.

INDIANAPOLIS Brush & Broom Mfg. Co., Indianapolis, Ind.

MASON Brush Works, Worcester, Mass.

OSBORN Mfg. Co., Cleveland, O. (See page opposite.)

SMITH Foundry Supply Co., J. D., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

PAINT AND VARNISH BRUSHES

(For Striping Brushes—See Wheels, Striping)

BOAR'S HEAD—See Fisher-Mitchell Co.

BRADLEY & Smith, New York, N. Y.

BURTON & Co., A. E., Boston, Mass.

CLEVELAND Window Glass Co., Cleveland, Ohio.

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Soda and Potash Kettles

For quickly, thoroughly and economically cleansing all l, grease and chips from newly made machine parts pre- rafory to being case hardened, plated or assembled, also ndy for cleansing parts of machinery of all descriptions in pair shops or garages which are being repaired or over- uled. More economical and safer to use than gasoline for eansing. Heated by Bunsen burner. Better than steam cketed kettles because they are portable and require no pensive steam traps, special piping or drainage. Two tes. Ten gallons capacity and thirty gallons capacity. Low st as compared with steam kettles. In stock ready for ompt shipment Send for descriptive circular K to-day.

IE GRAY & PRIOR MACHINE CO., 32 Suffield Street, Hartford, Conn.

The "NEW BRITAIN" Portable Vise Stand

A Combined Work Bench and Tool Cabinet.

Stationary or Portable

An Indispensable item in every machine shop, public and private garage.

Useful in close quarters. No neap to manipulate. Great stren th without superfluous weight

Ample storage capacity for tools inside cabinet

Vise is standard height and will stand heavy filing and clipping.

DEALERS

This is a big money maker--sells on sight.

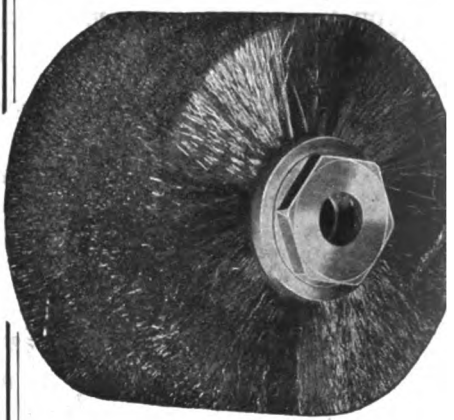
Write for prices

The New Britain Machine Co.

Orginators of Shop Furniture

NEW BRITAIN, CONN. U. S. A.

The "Osborn" Tire-Roughing Brush



Economical—Effective

A Sectional Fine Steel Wire Wheel Brush made especially for roughing treads on automobile tires.

The Brass Hub is practically indestructible. Brush part is made up of wire sections, which, when worn out, may be easily replaced with new ones, at a small cost.

The brush is operated on an ordinary emery grinder.

This brush does the work quicker, better and more economically than any other methods.

Adopted by some of the largest auto-tire manufacturers.

The "Osborn" Spark-Plug Brush

A combination Wire and Bristle Brush. The stiff, fine wire to clean off the carbon and soot and the tuft of bristle at end of brush for the finer parts. With every brush is a piece of flat steel wire for cleaning out those parts of the plug ordinarily inaccessible, much more effective than rags, sandpaper, etc. Packed in individual boxes.

Every auto driver will carry one.

THE OSBORN MANUF'G CO.

CLEVELAND

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BRUSHES (Continued)

PAINT AND VARNISH BRUSHES (Continued)

DENNIN'S Sons, O., Troy, N. Y.

DEVOE & C. T. Reynolds Co., F. W., New York, N. Y.

FISHER-MITCHELL Co., New York, N. Y. "Boar's Head."

FRENCH & Co., Samuel H., Philadelphia, Pa.

GERTS, Lombard & Co., Chicago, Ill.

HANLON & Goodman Co., New York, N. Y.,

LUCAS & Co., John, Philadelphia, Pa.

MILES Bros. & Co., New York, N. Y.

PACKARD & Co., A., Boston, Mass.

ROBBE[illegible] Brush Co., Newark, N. J.

THAYER & Co., P. E., Pawtucket, R. I.

UNITED Brush Manufactories, New York, N. Y.

UNITED Brush Supply Co., Philadelphia, Pa.

WASHBURN Co., Ira D., Cincinnati, O.

WHITING-J. J. Adams Co., John L., Boston, Mass.

VARNISH BRUSHES

(See Brushes, Paint and Varnish)

BULLDOZERS

AJAX Mfg. Co., Cleveland, O.

BLISS Co., E. W., Brooklyn, N. Y.

LONG & Allstatter Co., Hamilton, O.

NILES-BEMENT-POND Co., New York, N. Y.

WILLIAMS, White & Co., Moline, Ill.

CALIPERS

CALIPERS AND DIVIDERS

(For Micrometer Calipers—See Micrometers)

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

COPELANDS—See Eagan, Thos. F.

EAGAN, Thos. F., Worcester, Mass. "Copelands."

FAY—See Starrett Co.

GOODELL-PRATT Co., Greenfield, Mass.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn.
(See page 301.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SCHUCHARDT & Schutte, West St. Bldg, New York, N. Y.
(See page 347.)

SMITH Co., E. G., Columbia, Pa.

STARRETT Co., L. S., Athol, Mass. "Fay, "Yankee."

YANKEE—See Starrett Co.

CHAPLETS

FOUNDRY CHAPLETS

BURDICK & Son, Albany, N. Y.

CLEVELAND Chaplet & Mfg. Co., Cleveland, O.

GEM Mfg. Co., Pittsburg, Pa.

LINDSAY & Co., W. W., Philadelphia, Pa.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PAXSON Co., J. W., Philadelphia, Pa.

SHANAFELT Mfg. Co., Canton, O.

UNITED States Chaplet & Supply Co., New York, N. Y.

CHISELS

CAPE CHISELS

(See Chisels, Cold and Cape)

COLD AND CAPE CHISELS

AKRON Machine Co., Akron, O.

ANDERSON Forge & Machine Co., 18[illegible] Aubin Ave., Detroit, Mich.
(See page opposite.)

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BREWER Bros., Philadelphia, Pa.

BUCK Bros., Milbury, Mass.

CARVER Tool Works, Spring Valley, N. Y.

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DIAMOND—See Whitman & Barnes Mfg. Co.

DICKE Tool Co., Downers Grove, Ill.

DREW & Co., C., Kingston, Mass.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

HUBBARD & Co., Pittsburg, Pa.

JOHNSON, Wm., Newark, N. J.

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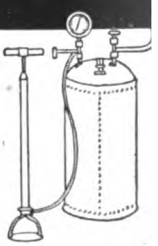

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CHISELS (Continued)

COLD AND CAPE CHISELS (Continued)

KILBORN & Bishop Co., New Haven, Conn.

KLEIN-LOGAN Co., Pittsburg, Pa.

KRAEUTER & Co., Newark, N. J.

MOUND Tool & Scraper Co., 708 Howard St., St. Louis, Mo. (See page 355.)

NATIONAL Cutlery Co., Detroit, Mich.

NOONAN Tool & Machine Co., A. S., Rome, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

SCHUTTE & Co., E. G., Cincinnati, O.

SMITH & Co., H. D., Plantsville, Conn.

SNELL Mfg. Co., Fiskdale, Mass.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VERONA Tool Works, Pittsburgh, Pa.

WHITMAN & Barnes Mfg. Co., Chicago, Ill. "Diamond."

WOODWORKERS CHISELS AND GOUGES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUCK Bros., Milbury, Mass.

JENNINGS & Co., C. E., New York, N. Y.

MACK & CO., Rochester, N. Y.

OHIO Tool Co., Columbus, O.

PECK Stow & Wilcox Co., Southington, Conn.

SWAN Co., Jas., Seymour, Conn.

WHITE Co., L. & I. J., Buffalo, N. Y.

WINSTED Edge Tool Works, Winsted, Conn.

BROWN & Co., R. H., New Haven, Conn "Reid."

CLEVELAND Twist Drill Co., Cleveland, O

CUSHMAN Chuck Co., Hartford, Conn.

DETROIT Twist Drill Co., Detroit, Mich.

GOODELL Mfg. Co., Greenfield, Mass.

GOODELL-PRATT Co., Greenfield, Mass.

GRONKVIST Drill Chuck Co., Jersey City, N. J.

HORTON & Son Co., E., Windsor Locks, Conn.

JACOBS Mfg. Co., Hartford, Conn.

LITTLE GIANT—See Westcott Chuck Co.

McCROSKY Reamer Co., Meadville, Pa.

MILLER'S Falls Co., 30 Warren St., New York, N. Y. (See page 361.)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL—See Oneida National Chuck Co.

ONEIDA—See Westcott Chuck Co.

ONEIDA National Chuck Co., Oneida, N. Y. "National."

PRATT Chuck Co., Frankfort, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

REID—See Brown & Co.

RUSSELL Anti-Friction Drill Chuck Co. Elmira, N. Y.

SCHUCHARDT & Schutte, West St. Bldg. New York, N. Y. (See page 347.)

SKINNER Chuck Co., New Britain, Conn.

STANDARD Tool Co., Cleveland, O.

TRUMP Bros. Machine Co., Wilmington, Del.

UNION Mfg. Co., New Britain, Conn.

VICTOR Tool Co., Waynesboro, Pa. (See page 349.)

WESTCOTT Chuck Co., Oneida, N. Y. "Little Giant," "Oneida."

WHITNEY Mfg. Co., Hartford, Conn. (See page 463.)

WHITON Machine Co., D. E., New London, Conn.

CHUCKS

BORING AND PLANING MILL CHUCKS

GISHOLT Machine Co., Madison, Wis.

HORTON & Son Co., E., Windsor Locks, Conn.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

UNION Mfg. Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

DRILL CHUCKS

ALMOND Mfg. Co., T. R., 1 Maple St., Ashburnham, Mass. (See page 283.)

LATHE CHUCKS

CINCINNATI Chuck Co., Cincinnati, O.

CUSHMAN Chuck Co., Hartford, Conn.

HOGGSON & Pettis Mfg. Co., New Haven, Conn. "Sweetland."

HORTON & Son Co., E., Windsor Locks, Conn.

JORDAN—See Reed Co.

ONEIDA National Chuck Co., Oneida, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

REED Co., Francis, Worcester, Mass. "Jordan."

SKINNER Chuck Co., New Britain, Conn.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SWEETLAND—See Hoggson & Pettis Co.

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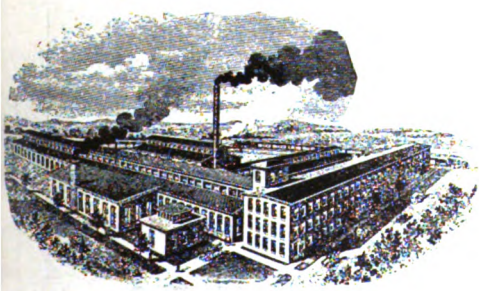

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CHUCKS (Continued)

LATHE CHUCKS (Continued)

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WESTCOTT Chuck Co., Oneida N. Y.

WHITON Machine Co., D. E., New London, Conn.

MAGNETIC CHUCKS

WALKER, Co., O. S., Worcester, Mass.

MILLING MACHINE CHUCKS

BROWN & Sharpe Mfg. Co., Providence, R. I.

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

SKINNER Chuck Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

PLANER CHUCKS

JORDAN—See Oneida National Chuck Co.

NEW HAVEN Mfg. Co., New Haven, Conn.

ONEIDA National Chuck Co., Oneida, N. Y., "Jordan."

SKINNER Chuck Co., New Britain, Conn.

UNION Mfg. Co., New Britain, Conn.

PNEUMATIC CHUCKS

MANUFACTURERS' Equipment Co., Chicago, Ill. "Aerochuck."

SCREW MACHINE CHUCKS

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

CLAMPS

MACHINISTS CLAMPS

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVES—See Cincinnati Tool Co.

IDEAL Machine Works, Brooklyn, N. Y.

LE COUNT, Wm. G., S. Norwalk, Conn.

MARK Mfg. Co., Evanston, Ill.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

TAYLOR Mfg. Co., James L., Bloomfield, N. J.

WOODWORKERS CLAMPS

ALDRICH Co., Wm. K., Lowell, Mass.

BATAVIA Clamp Co., Batavia, N. Y. "Colts."

BLISS Mfg. Co., R., Pawtucket, R. I.

BUFFALO—See Josef Mfg. Co.

CHAPIN-STEVENS Co., Pine Meadow, Conn.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

COLTS—See Batavia Clamp Co.

DANN Bros. & Co., New Haven, Conn.

EAGLE—See Woodruff & Sons Co.

EBERHARD Mfg. Co., Cleveland, O.

ERIE Stamping & Mfg. Co., Erie, Pa. "Thompson."

GRAND Rapids Hand Screw Co., Grand Rapids, Mich.

HARGRAVES—See Cincinnati Tool Co.

JOSEF Mfg. Co., E. E., Buffalo, N. Y. "Buffalo."

MARK Mfg. Co., Evanston, Ill.

MT. CARMEL—See Woodruff & Sons Co.

NATIONAL Novelty Corp., New York, N. Y.

OHIO Tool Co., Columbus, O.

PECK, Stow & Wilcox Co., Southington, Conn.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

SANDUSKY Tool Co., Sandusky, O.

SHELDON & Co., E. H., Chicago, Ill.

TAYLOR Mfg. Co., James L., Bloomfield, N. J.

THOMPSON—See Erie Stamping & Mfg. Co.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. "Eagle," "Mt. Carmel." See page 141.)

CLIPPERS

BOLT AND RIVET CLIPPERS

(Hand Power)

ALLEN-RANDALL—See Porter, H. K.

CHAMBERS Bros. Co., Philadelphia, Pa.

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BOLT AND RIVET CLIPPERS (Continued)

COLUMBUS Bolt Works, Columbus, O.

EASY—See Porter, H. K.

ELM CITY—See Schollhorn Co.

HELWIG Mfg. Co., St. Paul, Minn.

METAL Stamping Co., New York, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PORTER, H. K., Everett, Mass. "Easy," "Allen-Randall."

ROBERTS Mfg. Co., Somerville, Mass. "Victor."

SCHOLLHORN Co., Wm., New Haven, Conn. "Elm City."

VICTOR—See Roberts Mfg. Co.

RIVET CLIPPERS

(See Clippers, Belt and Rivet)

COMPOUNDS

BRAZING COMPOUNDS

A. & J. Mfg. Co., Chicago, Ill.

BANNER—See Cortland Specialty Co.

CAST Iron Brazing Co., Manchester, N. H.

CLEVELAND Block Co., Cleveland, O.

CORTLAND Specialty Co., Cortland, N. Y. "Banner."

DIXON Crucible Co., Jos., Jersey City, N. J. (See page opposite.)

FLUXINE—See Krembs & Co.

KAST-I-ON—See Taber, A. T.

KREMBS & Co., Chicago, Ill. "Fluxine."

SCHNEIDER, Inc., Emil, 298-306 South St., Newark, N. J. (See page opposite.)

STANDARD Brazing Co., Boston, Mass.

TABER, A. T., Corona, Cal. "Kast-I-on."

TURNER Brass Works, Sycamore, Ill.

UNIVERSAL Fluxine Co., Urbana, O.

BUFFING AND POLISHING COMPOUNDS

AUBURN Soap & Chemical Co., Auburn, N. Y. "Crown," "Ebonite."

CROWN—See Auburn Soap & Chemical Co.

EASTON Polishing Supply Co., Easton, Pa.

EBONITE—See Auburn Soap & Chemical Co.

STEVENS, Frederic B., Detroit, Mich. "White Rose."

WHITE ROSE—See Stevens, Frederic B.

CASE HARDENING COMPOUNDS

ALTEMUS & Co., W. F., Hartford, Conn.

HOUGHTON & Co., E. F., Philadelphia, Pa.

MOSSO, C. A., Chicago, Ill.

ROGERS & Hubbard Co., Middletown, Conn.

CORE COMPOUNDS

ESSO—See Obermayer Co.

GLUTRIN—See Robeson Process Co.

KANTBEBEAT—See Obermayer Co.

MILLS Mfg. Co., H. E., Syracuse, N. Y. "Syracuse."

OBERMAYER Co., S., Cincinnati, O. "Kantbebeat," "Esso."

ROBESON Process Co., Au Sable Forks, N. Y. "Glutrin."

SYRACUSE—See Mills Mfg. Co.

POLISHING COMPOUNDS

(See Compounds, Buffing and Polishing)

WELDING COMPOUNDS

CORTLAND Welding Compound Co., Cortland, N. Y.

DINGEE, Mont H., Lynchburg, Va.

KREMBS & Co., Chicago, Ill. "Weldine."

WELDINE—See Krembs & Co.

COUNTERBORES

AMERICAN Die & Tool Co., Reading, Pa.

CLEVELAND Twist Drill Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

REECE Co., E. F., Greenfield, Mass.

COUNTERSINKS

AMERICAN Die & Tool Co., Reading, Pa.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

CLEVELAND Twist Drill Co., Cleveland, O.

DEUSE, J. S., Chester, Conn.

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COUNTERSINKS (Continued)

DIAMOND—See Whitman & Barnes Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVES—See Cincinnati Tool Co.

HUMPHREYSVILLE Mfg. Co., Seymour, Conn.

JOHNSON, Wm., Newark, N. J.

KILBORN & Bishop Co., New Haven, Conn.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

REECE Co., E. F., Greenfield, Mass.

SNELL Mfg. Co., Fishdale, Mass.

STANDARD Tool Co., Cleveland, Ohio.

STARRETT Co., L. S., Athol, Mass.

SWAN Co., Jas., Seymour, Conn.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK, Mfg. Co., Brockton, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

WHITMAN & Barnes Mfg. Co., Chicago, Ill. "Diamond."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."

PEERLESS—See Harrington, Son & Co.

ROUND & Son, D., Cleveland, O.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

YALE & Towne Mfg. Co., New York, N. Y.

CRUCIBLES

METAL MELTING CRUCIBLES

BRIDGEPORT Crucible Co., Bridgeport, Conn.

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 313.)

GAUTIER & Co., J. H., Jersey City, N. J.

McCULLOUGH-DALZELL Crucible Co., Pittsburg, Pa.

PAIGE Retort & Crucible Co., Taunton, Mass. (See page opposite.)

ROSS-TACONY Crucible Co., Philadelphia, Pa.

SEIDEL, B. B., Philadelphia, Pa.

TAUNTON Crucible Co., Taunton, Mass.

TAYLOR, Robert J., Philadelphia, Pa.

WATERBURY Crucible Co., Waterbury, Conn.

WISCONSIN Graphite Co., Stevens Point, Wis.

CRANES

PORTABLE CRANES, HOISTS AND CHAIN BLOCKS

ACME—See Moore Co.

CANTON Foundry & Machine Co., Canton, O.

CHISHOLM & Moore Mfg. Co., Cleveland, O. "Cyclone."

CYCLONE—See Chisholm & Moore Mfg. Co.

DALE Engine Supply Co., Franklin, Pa.

DOBBIE Foundry & Machine Co., Niagara Falls, N. Y.

FRANKLIN Portable Crane & Hoist Co., Franklin, Pa.

GINTER, J. M., Wooster, O.

HARRINGTON, Son & Co., Edwin, Philadelphia, Pa. "Peerless."

HERCULES—See Nicholls, Wm. S.

MOORE Co., Franklin, Winsted, Conn. "Acme."

NICHOLLS, Wm. S., New York, N. Y. "Hercules."

NILES-BEMENT-POND Co., New York, N. Y.

CUPOLAS

FOUNDRY CUPOLAS

BIGELOW Co., New Haven, Conn.

BYRAM & Co., Detroit, Mich.

CALUMET Engineering Works, Harvey, Ill.

DETROIT Foundry Supply Co., Detroit, Mich.

McCORMICK Co., J. S., Pittsburg, Pa.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NORTHERN Engineering Works, Detroit.

PAXSON Co., J. W., Philadelphia, Pa.

WHITING Foundry Equipment Co., Harvey, Ill.

CUTTERS

BAR CUTTERS

(See Cutters, Rod and Bar)

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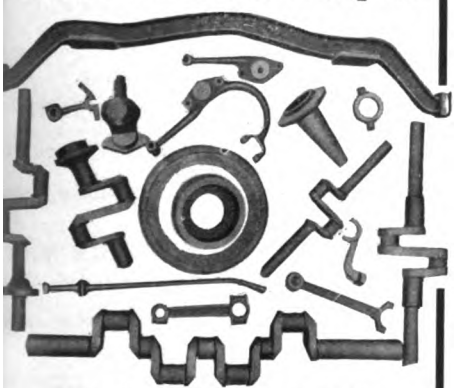

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¶ The "Victor Clutch Compound" will absolutely prevent the slipping of clutches, and, in fact, any friction surfaces, such as the belts of motor cycles, the surfaces of friction-drive cars, weak brakes, etc. It is an unfailing specific for these automobile diseases and weaknesses:

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¶ This "Compound" is indispensable for automobile clutches and will make any one of them perform its work properly. Being in a liquid form makes it very convenient and easy to apply.

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Friction-Drive Cars

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CUTTERS (Continued)

GASKET CUTTERS

(See Cutters, Washers and Gasket)

LEATHER FILLET CUTTERS

MILWAUKEE Foundry Supply Co., Milwaukee, Wis.

MILLING CUTTERS

AMERICAN Die & Tool Co., Reading, Pa.

BALDWIN Steel Co., New York, N. Y. "Hudson."

BECKER Milling Machine Co., Hyde Park, Mass.

BOKER & Co., Herman, New York, N. Y. (Importers.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CLEVELAND Twist Drill Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GEOMETRIC Tool Co., New Haven, Conn.

HARRISON & Knight Mfg. Co., Newark, N. J.

HUDSON—See Baldwin Steel Co.

INGERSOLL Milling Machine Co., Rockford, Ill.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Tool Co., Cleveland, O.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

OWEN Machine Tool Co., Springfield, O.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

ROGERS Works, John M., Gloucester City, N. J.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STANDARD TOOL CO., Cleveland, O.

UNION Twist Drill Co., Athol, Mass.

WHITNEY Mfg. Co., Hartford, Conn. (See page 463.)

PIPE CUTTERS

(Hand Power)

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 369.)

ARMSTRONG Mfg. Co., 295 Knowlton St., Bridgeport, Conn. (See page 373.)

AYES & Co., Chicago, Ill. "Barnes," "Saunders."

BARNES—See Ayes & Co.

BARNES Tool Co., New Haven, Conn.

BUTTERFIELD & Co., Derby Line, Vt.

CURTIS & Curtis Co., Bridgeport, Conn.

ERIE Tool Works, Erie, Pa.

HEADSON—See Ross Gear & Tool Co.

HOLLANDS Mfg. Co., Erie, Pa. "Keystone."

KEYSTONE—See Hollands Mfg. Co.

MARK Mfg. Co., Evanston, Ill.

OSWEGO Tool Co., Oswego, N. Y.

REED Mfg. Co., Erie, Pa.

ROSS Gear & Tool Co., Lafayette, Ind. "Headson."

SAUNDERS—See Ayes & Co.

SAUNDERS Sons, D., Yonkers, N. Y.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., 55-71 Amory St., Roxbury, Mass. "Trimo." (See page 373.)

WELLS & Son Co., F. E., Greenfield, Mass.

ROD AND BAR CUTTERS

(Hand Power)

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

BELDEN Machine Co., New Haven, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

MARVEL—See Armstrong-Blum Mfg. Co.

MERSICK Co., C. S., New Haven, Conn.

SPRUE CUTTERS

BARNETT Foundry Co., Oscar, Newark, N. J.

BLISS Co., E. W., Brooklyn, N. Y.

BRASS Founders' Supply Co., Newark, N. J.

SHUSTER Co., F. B., New Haven, Conn.

TURNER Machine Co., Philadelphia, Pa.

WASHER OR GASKET CUTTERS

BONNEY Vise & Tool Works, Philadelphia, Pa.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVES—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

ROSE, J. A., Hastings, Neb.

SMITH, Otis A., Rockfall, Conn.

STORTZ & Son, John, Philadelphia, Pa.

DIES

SCREW CUTTING DIES

(See Taps and Dies)

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Steel Tanks and Sheet Iron Work of Every Description.

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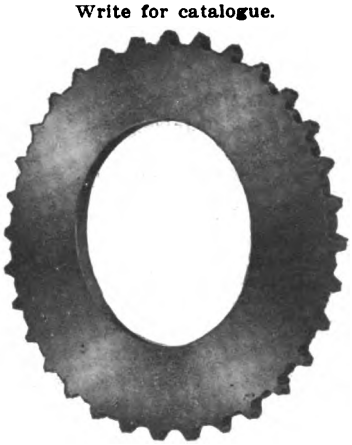

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DIVIDERS

DIVIDERS AND CALIPERS

(See Calipers and Dividers)

DOGS

LATHE DOGS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

AYES & Co., Chicago, Ill. "Le Counts."

BESLY & Co., Chas. H., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BONNEY Vise & Tool Works, Philadelphia, Pa.

HILL Standard Mfg. Co., Anderson, Ind.

LE COUNTS—See Ayes & Co.

LE COUNT, Wm. G., S. Norwalk, Conn.

MARK Mfg. Co., Evanston, Ill.

O. K. Tool Holder Co., Shelton, Conn.

OSWEGO Tool Co., Oswego, N. Y.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

WESTERN Tool & Mfg. Co., Springfield, O.

WILLIAMS & Co., J. H., Brooklyn, N. Y.

MILLING MACHINE DOGS

HILL Mfg. Co., M. B., Worcester, Mass. (See page opposite.)

DOWELS

PATTERN MAKERS DOWELS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BUTLER, A. G., New York, N. Y.

CLEVELAND Fillet Co., Cleveland, O.

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

MORSE, Frank W., 514-16 Atlantic Ave., Boston, Mass. (See page 375.)

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

DRESSERS

EMERY WHEEL DRESSERS

BAY State Stamping Co., Worcester, Mass. "Bennett."

BENNETT—See Bay State Stamping Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

BUILDERS Iron Foundry Co., Providence, R. I.

CALDER, Geo. H., Lancaster, Pa.

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Screw Co., Chicago, Ill.

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

COLUMBUS Bolt Works, Columbus, O.

CROWN—See Clizbe Bros. Mfg. Co.

DESMOND-STEPHAN Mfg. Co., Urbana, O. "Diamo-Carbo."

DIAMO-CARBO—See Desmond-Stephan Mfg. Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DICKINSON, Thos. L., New York, N. Y.

HUNTINGTON—See Mark Mfg. Co.

HUNTINGTON—See Western Automatic Machine Screw Co.

MARK Mfg. Co., Evanston, Ill. "Huntington."

OSGOOD, J. L., Buffalo, N. Y.

PENINSULA Emery Wheel Co., Detroit, Mich.

REED Mfg. Co., Erie, Pa.

SHERMAN Mfg. Co., Detroit, Mich.

STANDARD Screw Co., Chicago, Ill.

STANDARD TOOL CO., Cleveland, O.

STERLING—See Diamond Saw & Stamping Works.

STERLING Machine & Stamping Co., Vermillion, O. (See page 459.)

WESTERN Automatic Machine Screw Co., Elyria, O. "Huntington."

WESTERN Tool Works, Galesburg, Ill.

WRIGLEY Co., Thomas, Chicago, Ill.

DRILLS

BREAST DRILLS

FRAY & Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

LANCASTER Machine & Knife Works, Lancaster, N. Y. "McClellan."

McCLELLAN—See Lancaster Machine & Knife Works.

MILLER'S Falls Co., 30 Warren St., New York, N. Y. (See page 361.)

PECK, Stow & Wilcox Co., Southington, Conn.

TURNER & Deegan, Bristol, Conn.

CENTERING DRILLS

CLEVELAND Twist Drill Co., Cleveland, O

LORD Co., L. L., Meadville, Pa.

SLOCOMB Co., J. T., Providence, R. I.

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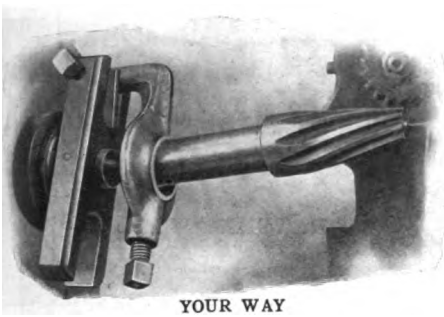
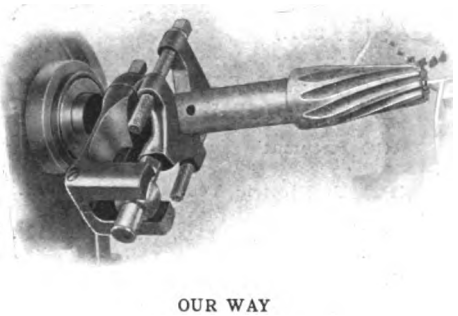
THE HILL MILLING MACHINE DOG AND DRIVER



YOUR WAY



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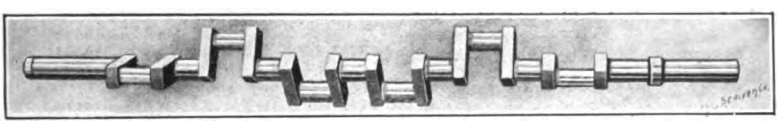

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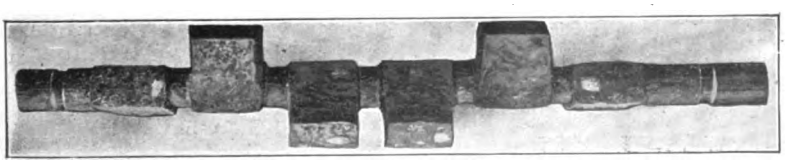

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DRILLS (Continued)

MULTIPLE SPINDLE DRILLS

BAUSCH Machine Tool Co., Springfield, Mass.

FOOTE-BURT Co. ,Cleveland, O.

GARDAM & Sons, Wm., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

PORTABLE DRILLS AND POLISHERS

CHICAGO Pneumatic Tool Co., Chicago, Ill. "Duntley."

CINCINNATI Electric Tool Co., Cincinnati, O.

CLARK, Jr., & Co., James, Louisville, Ky. "Willey."

COATES Clipper Mfg. Co., Worcester, Mass.

CURTIS Auto-Buffer Co., Olean, N. Y.

DUNTLEY—See Chicago Pneumatic Tool Co.

GEM Mfg. Co., Pittsburg, Pa.

HISEY-WOLF Machine Co., Cincinnati, O.

LAMB Electric Co., Grand Rapids, Mich.

STOW Flexible Shaft Co., Philadelphia, Pa.

U. S. Electrical Tool Co., Cincinnati, O. (See page 343.)

WILLEY—See Clark, Jr., & Co.

POST DRILLS

ADVANCE—See Silver Mfg. Co.

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, Pa.

FOOS Mfg. Co., Springfield, O.

GREEN RIVER—See Wiley & Russell Mfg. Co.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

LITTLE GIANT—See Noyes & Co.

NILES-BEMENT-POND Co., New York, N. Y.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

PECK, Stow & Wilcox Co., Southington, Conn.

REED Co., Francis, Worcester, Mass.

SILVER Mfg. Co., Salem, O. "Advance."

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River."

RADIAL DRILLS

AMERICAN Tool Works Co., Cincinnati, O.

BAUSCH Machine Tool Co., Springfield, Mass.

BICKFORD Drill & Tool Co., Cincinnati, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

GANG Co., Wm. E., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HILBERT Machine Co., Cincinnati, O.

MUELLER Machine Tool Co., Cincinnati, O.

MORRIS Foundry Co., John B., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

PRENTICE Bros. Co., Worcester, Mass.

SELLERS & Co., Wm., Philadelphia, Pa.

WESTERN Machine Tool Works, Hamilton, Mich.

RATCHET DRILLS

ARMSTRONG Bros. Tool Co., Chicago.

ATHA Tool Co., Newark, N. J.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CURTIS & Curtis Co., Bridgeport, Conn.

DIAMOND—See Whitman & Barnes Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

HUNTER Machine Co., Jas., North Adams, Mass.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Monarch."

LITTLE GIANT—See Wells Bros. Co.

LOWELL Wrench Co., Worcester, Mass. (See page 373.)

MILLER'S Falls Co., 30 Warren St., New York, N. Y. (See page 361.)

MONARCH—See Keystone Mfg. Co.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

OSWEGO Tool Co., Oswego, N. Y. "Packer."

PACKER—See Billings & Spencer Co.

PACKER—See Oswego Tool Co.

PANCOAST & Co., Henry B., Philadelphia, Pa. "Smith's."

PARKER Co., Chas., Meriden, Conn.

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn. "Renshaw." (See page 301.)

RENSHAW—See Pratt & Whitney Co.

SMITH'S—See Pancoast & Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

WHITMAN & Barnes Mfg. Co., Chicago, Ill. "Diamond."

SENSITIVE DRILLS

BARR, H. G., Worcester, Mass.

DWIGHT Slate Machine Co., Hartford, Conn.

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DRILLS (Continued)

SENSITIVE DRILLS (Continued)

FOOTE-BURT Co., Cleveland, O.

FOX Machine Co., Grand Rapids, Mich.

GROTON Machine Tool Co., Groton, N. Y.

HAMILTON Machine Tool Co., Hamilton, O.

HENRY & Wright Mfg. Co., Hartford, Conn.

KNECHT Bros. Co., Cincinnati, O.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

MECHANICS Machine Co., Rockford, Ill.

MIAMI Valley Machine Tool Co., Dayton, O.

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

PRENTICE Bros. Co., Worcester, Mass.

REED Co., Francis, Worcester, Mass.

ROCKFORD Machine & Shuttle Co., Rockford, Ill.

ST. LOUIS Machine Tool Co., St. Louis, Mo.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SIGOURNEY Tool Co., Hartford, Conn.

STAPF & Co., John B., Dunkirk, N. Y.

WASHBURN Shops, Worcester, Mass.

TURRET DRILLS

NATIONAL Separator & Machine Co., Boston, Mass.

QUINT, A. D., Hartford, Conn.

TWIST DRILLS

AMERICAN Die & Tool Co., Reading, Pa.

BALDWIN Steel Co., New York, N. Y. "Hudson."

CELFOR Tool Co., Chicago, Ill.

CLEVELAND Twist Drill Co., Cleveland, O.

DETROIT Twist Drill Co., Detroit, Mich.

DIAMOND—See Whitman & Barnes Mfg. Co.

HUDSON—See Baldwin Steel Co.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL—See Whitaker Mfg. Co.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

NEW Process Twist Drill Co., Taunton, Mass.

NORKA—See Whitman & Barnes Mfg. Co.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STANDARD Tool Co., Cleveland, O.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

UNION Twist Drill Co., Athol, Mass.

WHITAKER Mfg. Co., Chicago, Ill. "National." (See page 377.)

WHITMAN & Barnes Mfg. Co., Chicago, Ill. "Norka," "Diamond."

UPRIGHT DRILLS

AURORA Tool Works, Aurora, Ind.

BAKER Bros., Toledo, O.

BARNES Co., W. F. & John, Rockford, Ill.

BARNES Drill Co., Rockford, Ill.

BARR, H. G., Worcester, Mass.

CINCINNATI Machine Tool Co., Cincinnati, Ohio.

CORBIN-CHURCH Co., New Britain, Conn.

HAMILTON Machine Tool Co., Hamilton, O.

HOEFER Mfg. Co., Freeport, Ill.

KERN Machine Tool Co., Cincinnati, O.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

MECHANICS Machine Tool Co., Rockford, Ill.

PRENTICE Bros. Co., Worcester, Mass.

ROCKFORD Drilling Machine Co., Rockford Ill.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SIBLEY Machine Tool Co., So. Bend, Ind.

SNYDER & Son, J. E., Worcester, Mass.

SUPERIOR Machine Tool Co., Kokomo, Ind

TAYLOR & Fenn Co., Hartford, Conn.

TSCHUDI-McBARRON Machine Co., Dayton, O.

DRIVERS

SCREW DRIVERS

ARCADE Mfg. Co., Freeport, Ill.

AUTODRIVER—See Bridgeport Hardware Mfg. Corp.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BLACKSTONE—See Bridgeport Hardware Mfg. Corp.

BRAUNSDORF-MUELLER Co., Elizabeth N. J. "New Century."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. "Autodriver," "Gripshank," "Perfecto," "Blackstone," "Challenge."

BRISTOL—See Turner & Deegan.

BROWN & Co., R. H., New Haven, Conn "Clark's."

CHALLENGE—See Bridgeport Hardware Mfg. Corp.

CHAMPION—See Tower & Lyon Co.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

CLARK'S—See Brown & Co.

Complete Index to Classification appears on Pages 7 to 18.

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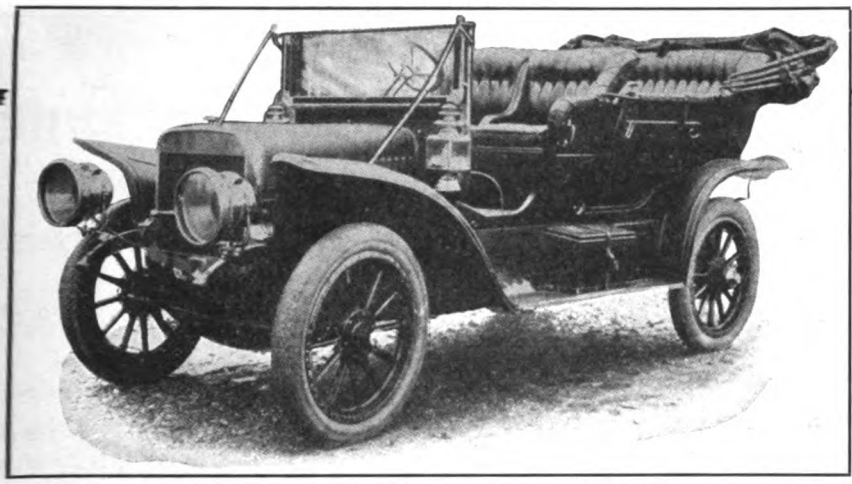

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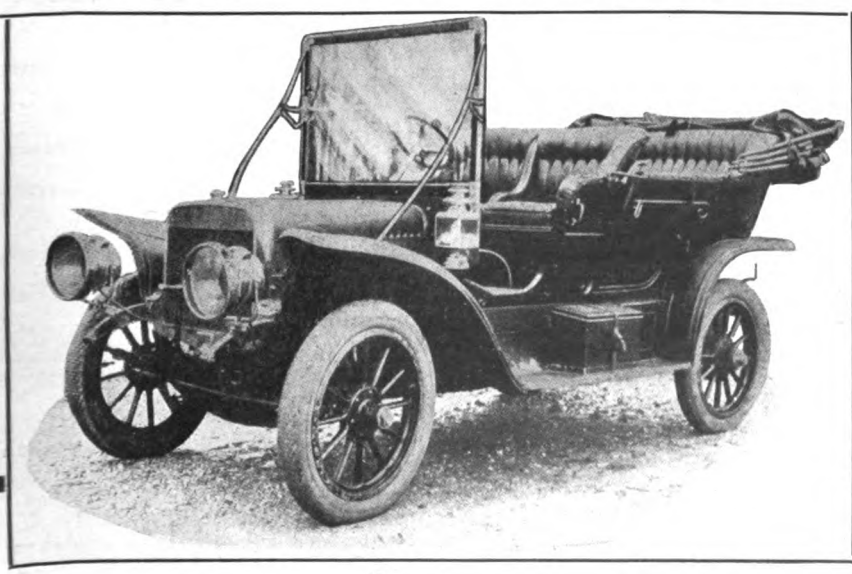

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DRIVERS (Continued)

SCREW DRIVERS (Continued)

CRONK & Carrier Mfg. Co., Elmira, N. Y. "Elmore," "Star."

DICKE Tool Co., Downers Grove, Ill.

DISSTON Sons, Henry, Philadelphia, Pa.

EDGEWOOD—See Turner & Deegan.

ELMORE—See Cronk & Carrier Mfg. Co.

ELMORE Tool Mfg. Co., Hartford, Conn.

GAY, Geo. E., Augusta, Me.

GOODELL-PRATT Co., Greenfield, Mass.

GRIPSHANK—See Bridgeport Hardware Mfg. Corp.

HARGRAVES—See Cincinnati Tool Co.

HERCULES—See Whitman & Barnes Mfg. Co.

JOHNSON, Wm., Newark, N. J.

MAYHEW Co., H. H., Shelburne Falls, Mass. "Monarch," "Star," "Shepardson," "Vulcan."

MONARCH—See Mayhew Co.

NEW CENTURY—See Braunsdorf-Mueller Co.

NORTH Bros. Mfg. Co., Philadelphia, Pa. "Yankee."

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

PERFECTION—See Tower & Lyon Co.

PERFECTO—See Bridgeport Hardware Mfg. Corp.

ROSEDALE—See Turner & Deegan.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SENSIBLE—See Vanderbeck Tool Works.

SHEPARDSON—See Mayhew Co.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SMITH & Hemmenway Co., New York, N. Y.

STAR—See Cronk & Carrier Mfg. Co.

STAR—See Mayhew Co.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SWAN Co., Jas., Seymour, Conn.

TUCK Mfg. Co., Brockton, Mass.

TURNER & Deegan, Bristol, Conn. "Rosedale," "Edgewood, "Bristol."

TOWER & Lyon Co., New York, N. Y. "Champion," "Perfection."

VANDERBEEK Tool Works, Hartford, Conn. "Sensible."

VULCAN—See Mayhew Co.

WHITMAN & Barnes Mfg. Co., Chicago, Ill. "Hercules."

YANKEE—See North Bros. Mfg. Co.

EXPANDERS

BOILER TUBE EXPANDERS

FORG, Peter, Somerville, Mass. **(See page 317.)**

NOONAN Tool & Machine Works, A. S. Rome, N. Y.

EXTRACTORS

BROKEN TAP EXTRACTORS

WALTON Co., Hartford, Conn.

FACINGS

FOUNDRY FACINGS AND PARTINGS

BRAND & Co., S. H., Chicago, Ill.

BROOKLYN Facing Mills, Brooklyn, N. Y.

DETROIT Foundry Supply Co., Detroit Mich. "Eureka."

DIXON Crucible Co., Jos., Jersey City N. J. **(See page 313.)**

DOGGETT, Stanley, New York, N. Y.

EUREKA—See Detroit Foundry Supply Co.

FOUNDRY Specialty Co., Cincinnati, "Partine."

LYCOPART—See Swoboda, L. J.

McCORMICK Co., J. S., Pittsburg, Pa.

MOORES Facing Works, Providence, R. I.

PARTINE—See Foundry Specialty Co.

SPRINGFIELD Facing Co., Springfield Mass.

SMITH Foundry Supply Co., J. D., Cleveland, O.

STEVENS, Frederic V., Detroit, Mich.

SWOBODA, L. J., New York, N. Y. "Lycopart."

UNITED STATES Graphite Co., Saginaw Mich.

FILES

FILES AND RASPS

AKRON File Co., Akron, O.

AMERICAN—See Nicholson File Co.

AMERICAN Swiss File & Tool Co., Elizabeth, N. J.

ARCADE—See Nicholson File Co.

BARNETT Co., G. & H., Philadelphia, Pa. "Black Diamond."

BLACK DIAMOND—See Barnett Co.

CARVER File Co., Philadelphia, Pa.

CHATTERTON File Works, Providence, R. I.

CHELSEA File Works, Norwich, Conn.

DISSTON & Sons, H., Philadelphia, Pa.

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FILES (Continued)

FILES AND RASPS (Continued)

FITCHBURG—See Simonds Mfg. Co.

GEM CITY File Works, Quincy, Ill.

GRAVES File Co., Newark, N. J.

HAYES File Co., Detroit, Mich.

HELLER Bros. Co., Newark, N. J.

JOHNSON & Bro. File Co., Newark, N. J. "Reliance."

LIVERRIGHT Bros., Philadelphia, Pa.

McCAFFREY File Co., Philadelphia, Pa.

MADDEN File Co., Middletown, N. Y.

MURCOTT & Campbell, Brooklyn, N. Y.

NATIONAL File & Tool Co., Philadelphia, Pa. "Vixen."

NICHOLSON File Co., Providence, R. I. "American," "Arcade."

RELIANCE—See Johnson & Bro. File Co.

REX File & Saw Co., Newcomerstown, O.

REYNOLDS Bros., Columbus, O.

SIMONDS Mfg. Co., Fitchburg, Mass. "Fitchburg."

STOKES Bros. Mfg. Co., Freehold, N. J.

TROJAN—See Troy File Works.

TROY File Works, Troy, N. Y. "Trojan."

VIXEN—See National File & Tool Co.

WESTPHAL & Co., F., Milwaukee, Wis.

FILLETS

WOOD AND LEATHER FILLETS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BUTLER, A. G., New York, N. Y.

CLEVELAND Fillet Co., Cleveland, O.

CLEVELAND Galvanizing Works Co., Cleveland, O.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

FLASKS

FOUNDRY FLASKS

ADAMS Co., Dubuque, Ia.

ARCADE Mfg. Co., Freeport, Ill.

BARNETT Foundry Co., Oscar, Newark, N. J.

BRASS Foundries Supply Co., Newark, N. J.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EUREKA—See Smith & Caffrey Co.

MACPHAIL Flask & Machine Co., Chicago, Ill.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., Philadelphia, Pa.

SMITH & Caffrey Co., Syracuse, N. Y. "Eureka."

FLUX

BRAZING FLUX

(See Compounds, Brazing)

SOLDERING FLUX

ALLEN Co., L. B., Chicago, Ill. "Sun," "Sampson."

ATLANTIC Chemical Works, Brooklyn, N. Y.

BENSON Co., Alex. R., Hudson, N. Y. "Yagers."

BILLINGS-CLAPP Co., Boston, Mass. "Simplicity."

BLAKE Signal & Mfg. Co., 246 Summer St., Boston, Mass. (See page 341.)

BURNLEY Battery & Mfg. Co., Painesville, O.

CALLAHAN & Co., Geo., New York, N. Y.

CRESCENT Co., Valparaiso, Ind. "Star."

DUNTON & Co., M. W., Providence, R. I. "Nokorode."

ELLIOTT Chemical Works, Newton, Mass.

KALBFLEISCH Co., Franklin St., Broadway & 16th St., New York, N. Y. (See page 113.)

GENERAL Chemical Co., New York, N. Y.

MARLOU Chemical Co., Jersey City, N. J. "Standard."

NOCOROSO—See Walsh Co.

NOKORODE—See Dunton & Co.

READE Mfg. Co., Hoboken, N. J.

RUBY Chemical Co., Johnstown, O.

SAMPSON—See Allen Co.

SCHNEIDER, Inc., Emil, 298-306 South St., Newark, N. J. (See page 313.)

SCHULTZ & Co., A., Baltimore, Md.

SIMPLICITY—See Billings-Clapp Co.

STANDARD—See Marlou Chemical Co.

STAR—See Crescent Co.

SUN—See Allen Co.

WALSH & Co., John F., Pittsfield, Mass. "Nocoroso."

YAGERS—See Benson Co.

WELDING FLUX

(See Compounds, Welding)

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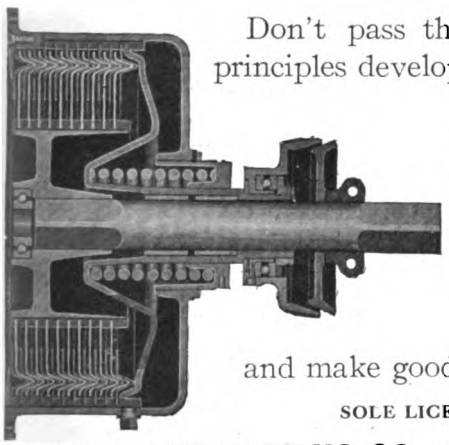

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FORGES

BLACKSMITHS FORGES

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief," "Challenge," "Hero," "Leader."

CANTON Foundry & Machine Co., Canton, Ohio.

CHALLENGE—See Canedy-Otto Mfg. Co.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Steam Gauge Co., Cleveland, Ohio.

HERO—See Canedy-Otto Mfg. Co.

KINSLEY Iron & Machine Co., Canton, Mass.

LEADER—See Canedy-Otto Mfg. Co.

ROYAL—See Canedy-Otto Mfg. Co.

SILVER Mfg. Co., Salem, O.

STURTEVANT Co., B. F., Hyde Park, Mass.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

FRAMES

HACK SAW FRAMES

(For Hack Saw Blades—See Blades, Hack Saw)

ATKINS & Co., E. C., Indianapolis, Ind. "Hoosier," "Indiana."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

CROWN—See Union Hardware Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DISSTON & Sons, Henry, Philadelphia, Pa. "Eagle," "Keystone."

EAGLE—See Disston & Sons.

EAGLE—See Union Hardware Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIFFIN & Co., G. W., Franklin, N. H.

HOOSIER—See Atkins & Co.

INDIANA—See Atkins & Co.

KEYSTONE—See Disston & Sons.

MASSACHUSETTS Saw Works, Chicopee, Mass. "Victor."

MILLER'S Falls Co., 30 Warren St., New York, N. Y. "Star."
(See page 361.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SIMONDS Mfg. Co., Fitchburg, Mass.

SMITH & Hemenway Co., New York, N. Y.

STAR—See Millers Falls Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Diamond Saw & Stamping Works.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNION Hardware Co., Torrington, Conn. "Crown," "Eagle."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

WEST Haven Mfg. Co., New Haven, Conn. "Utility," "Universal."

FULLERS

FULLERS AND SWAGES

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich.
(See page 307.)

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

EVANSVILLE Tool Works, Evansville, Ind.

GREEN RIVER—See Wiley & Russell Mfg. Co.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

KLEIN-LOGAN Co., Pittsburg, Pa.

LITTLE GIANT—See Noyes & Co.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

SWETT Iron Works, A. L., Medina, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WILEY & Russell Mfg. Co., Greenfield Mass. "Green River."

FURNACES

ANNEALING AND CASE HARDENING FURNACES

AMERICAN Gas Furnace Co., New York, N. Y.

BATES Machine Co., Joliet, Ill.

BEST American Calorific Co., W. N., New York, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CHICAGO Flexible Shaft Co., Chicago, Ill. "Stewart."

GILBERT & Barker Mfg. Co., Springfield, Mass.

MANCHESTER Gas Furnace Co., C. B., Providence, R. I.

STEWART—See Chicago Flexible Shaft Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WILE Power Gas Co., Rochester, N. Y.

WITTEMAN & Co., A. P., Philadelphia, Pa.

BABBITT MELTING FURNACES

AMERICAN Gas Furnace Co., New York, N. Y.

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FURNACES (Continued)

BABBITT MELTING FURNACES (Continued)

BEST American Calorific Co, W. N., New York, N. Y.

BUSEY Burner Co., Baltimore, Md.

DAVIS Machine Co., W. P., Rochester, N. Y. "Vesuvius."

MANCHESTER Gas Furnace Co., C. B., Providence, R. I.

VESUVIUS—See Davis Machine Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

BRASS AND COPPER MELTING FURNACES

BARNETT Foundry Co., Oscar, Newark, N. J.

BEST American Calorific Co., W. N., New York, N. Y.

BRASS Founders Supply Co., Newark, N. J.

HAWLEY Down Draft Furnace Co., Chicago, Ill.

JOHNSON Service Co., Milwaukee, Wis. (See page 257.)

KROESCHELL Bros. Co., Chicago, Ill. "Kroeschell-Schwartz."

KROESCHELL-SCHWARTZ—See Kroeschell Bros. Co.

LITTLEFORD Bros., Cincinnati, O.

MANCHESTER Gas Furnace Co., C. B., Providence, R. I.

MONARCH Engineering & Mfg. Co., Baltimore, Md. "Steele-Harvey."

STEELE-HARVEY—See Monarch Engineering & Mfg. Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WHITING Foundry Equipment Co., Harvey, Ill.

GASOLINE FURNACES

(See Torches, Gasoline)

GAUGES

CENTRE GAUGES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

WYKE & Co., J., Boston, Mass.

DEPTH GAUGES

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

DRILL AND WIRE GAUGES

BROWN & Sharpe Mfg. Co., Providence, R. I.

DISSTON & Sons, Henry, Philadelphia, Pa.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

LIMIT GAUGES

BROWN & Sharpe Mfg. Co., Providence, R. I.

LITTLE GIANT—See Wells Bros. Co.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

ROGERS Works, John M., Gloucester City, N. J.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

PLUG AND RING GAUGES

BROWN & Sharpe Mfg. Co., Providence, R. I.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PRATT &Whitney Co., Hartford, Conn. (See page 301.)

ROGERS Works, John M., Gloucester City, N. J.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

WELLS Bros. Co., Greenfield, Mass. (See page 367.)

RING GAUGES

(See Gauges, Plug and Ring)

SCREW PITCH GAUGES

ATHOL Machine Co., Athol, Mass.

BLODGETT Mfg. Co., Rochester, N. Y.

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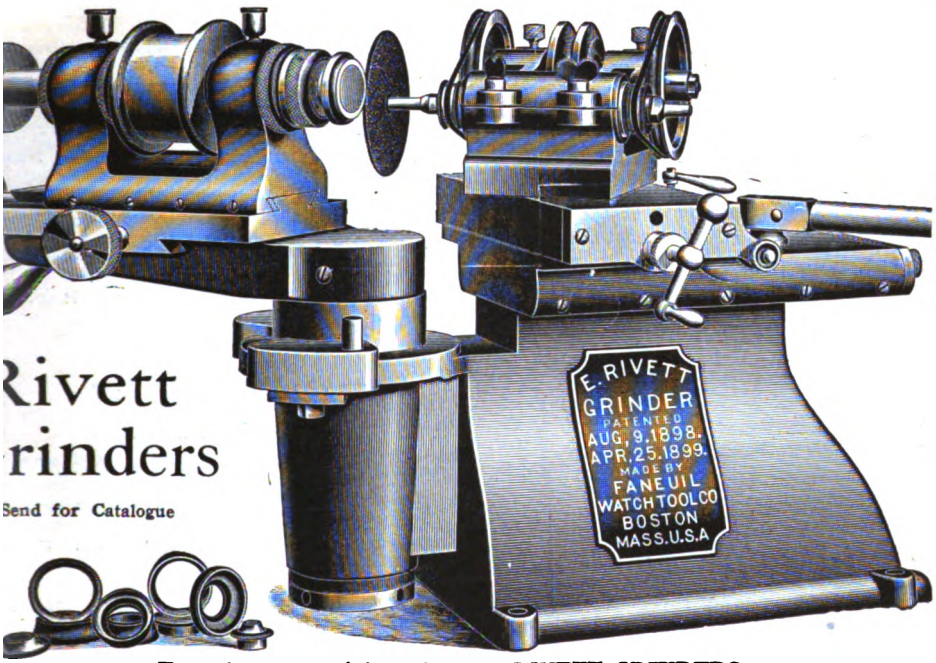

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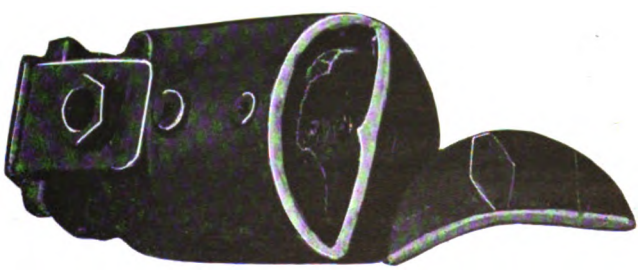
This water-jacket was cut out to permit welding the cracks in dome of cylinder, then piece removed was welded in. RESULT, PERFECT CYLINDER.



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GAUGES (Continued)

SCREW PITCH GAUGES (Continued)

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

LITTLE GIANT—See Wells Bros. Co.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SMITH Co., E. G., Columbia, Pa.

STARRETT Co., L. S., Athol, Mass.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

SURFACE GAUGES

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CARR'S—See Hoggson & Pettis Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

HOGGSON & Pettis Mfg. Co., New Haven, Conn. "Carr's."

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

WYKE & Co., J., Boston, Mass.

WIRE GAUGES

(See Gauges, Drill and Wire)

GRINDERS

CUTTER GRINDERS

(See Grinders, Reamer and Cutter)

CYLINDER GRINDERS

HEALD Machine Co., Worcester, Mass. (See page opposite.)

SAXON Machine Co., Holyoke, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

DISC GRINDERS

BESLY & Co., Chas. H., Chicago, Ill.

DIAMOND Machine Co., Providence, R. I.

GARDNER Machine Co., Beloit, Wis.

RANSOM Mfg. Co., Oshkosh, Wis.

DRILL GRINDERS

HEALD Machine Co., Worcester, Mass. (See page opposite.)

IDEAL Machine Works, Brooklyn, N. Y.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NEW YANKEE—See Wilmarth & Morman Co.

ROBINSON Tool Works, Waterbury, Conn.

WASHBURN Shops, Worcester, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich. "New Yankee."

INTERNAL GRINDERS

BATH Grinder Co., Fitchburg, Mass.

HEALD Machine Co., Worcester, Mass. (See page opposite.)

LANDIS Tool Co., Waynesboro, Pa. (See page 335.)

RIVETT Lathe Mfg. Co., Brighton, Boston, Mass. (See page 331.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

PISTON RING GRINDERS

ALERT—See Harding, S. B.

HARDING, S. B., Waukesha, Wis. "Alert."

HEALD Machine Co., Worcester, Mass. (See page opposite.)

SAXON Machine Co., Holyoke, Mass.

PLAIN TOOL GRINDERS

ATHOL Machine Co., Athol, Mass.

BATH Grinder Co., Fitchburg, Mass.

BLOUNT Co., J. G., Everett, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CANTON Foundry & Machinery Co., Canton, O.

CHALLENGE Machine Co., Philadelphia, Pa.

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

CROWN—See Clizbe Bros. Mfg. Co.

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 335.)

NORTON Grinding Co., Worcester, Mass.

OESTERLEIN Machine Co., Cincinnati, O.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

RANSOM Mfg. Co., Oshkosh, Wis.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

ST. LOUIS Machine Tool Co., St. Louis, Mo.

STAPF & Co., John B., Dunkirk, N. Y.

TABOR Mfg. Co., Philadelphia, Pa.

WALKER Grinder Co., Worcester, Mass.

WEBSTER & Perks Tool Co., Springfield, O.

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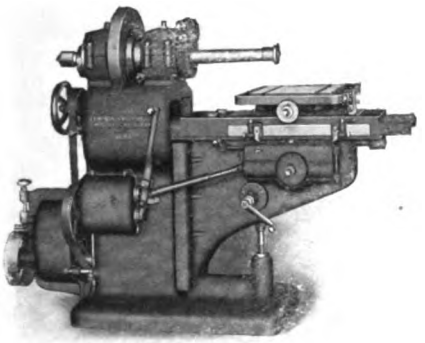
True and Perfect Rings



CYLINDER GRINDER

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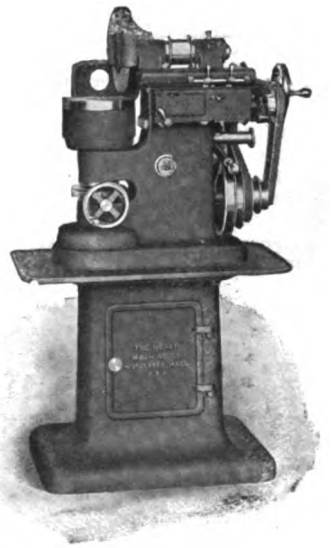

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THE HEALD MACHINE CO.

Station D-10, Worcester, Mass.

MAKERS OF GRINDING MACHINERY

Heald Internal Grinder
Heald Ring Grinder
Heald Cylinder Grinder
American Drill Grinder

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GRINDERS (Continued)

REAMER AND CUTTER GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Milling Machine Co., Cincinnati, O.

DAYTON Machine & Tool Works Co,, Dayton, O.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GREENFIELD Machine Co., Greenfield, Mass.

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

WALKER Grinder Co., Worcester, Mass.

WELLS & Son Co., F. E., Greenfield, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

SURFACE GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GREENFIELD Machine Co., Greenfield, Mass.

HEALD Machine Co., Worcester, Mass. (See page 333.)

LANDIS Tool Co., Waynesboro, Pa. (See page opposite.)

NATIONAL Machine Co., Hartford, Conn.

SAXON Machine Co., Holyoke, Mass.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

WALKER Grinder Co., Worcester, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

UNIVERSAL GRINDERS

BROWN & Sharpe Mfg. Co., Providence, R. I.

LANDIS Tool Co., Waynesboro, Pa. (See page opposite.)

WET TOOL GRINDERS

BLOUNT Co., J. G., Everett, Mass.

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

CHALLENGE Machine Co., Philadelphia, Pa.

EDGEMONT Machine Co., Dayton, O.

GISHOLT Machine Co., Madison, Wis.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis.

SELLERS & Co., Wm., Philadelphia, Pa.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

STERLING Emery Wheel Mfg. Co., Tiffin, O.

TUCKER Machine Co., Cincinnati, O.

WHITNEY Mfg. Co., Hartford, Conn. (See page 463.)

HAMMERS

BRASS AND COPPER HAMMERS

EUREKA Tempered Copper Works, North East, Pa.

GOODELL-PRATT Co., Greenfield, Mass.

UNION Hardware Co., Torrington, Conn.

WELCH & Co., Thomas F., Boston, Mass.

WEST HAVEN Mfg. Co., New Haven, Conn.

CLAW HAMMERS

ATHA Tool Co., Newark, N. J.

CENTRAL Hardware Co., Philadelphia, Pa.

CHENEY Hammer Co., Henry, Little Falls, N. Y. (See page 339.)

H. & B.—See Humason & Beckley Mfg. Co.

HUMASON & Beckley Mfg. Co., New Britain, Conn. "H. & B."

MAYDOLE Hammer Co., David, Norwich, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

MACHINISTS HAMMERS

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

CHENEY Hammer Co., Henry, Little Falls, N. Y. (See page 339.)

EVANSVILLE Tool Works, Evansville, Ind.

H. & B.—See Humason & Beckley Mfg. Co.

HELLER Bros. Co., Newark, N. J.

HUMASON & Beckley Mfg. Co., New Britain, Conn. "H. & B."

MAYDOLE Hammer Co., David, Norwich, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WARNER & Son, M. R., Cromwell, Conn.

POWER HAMMERS

BEAUDRY & Co., Boston, Mass. "Champion."

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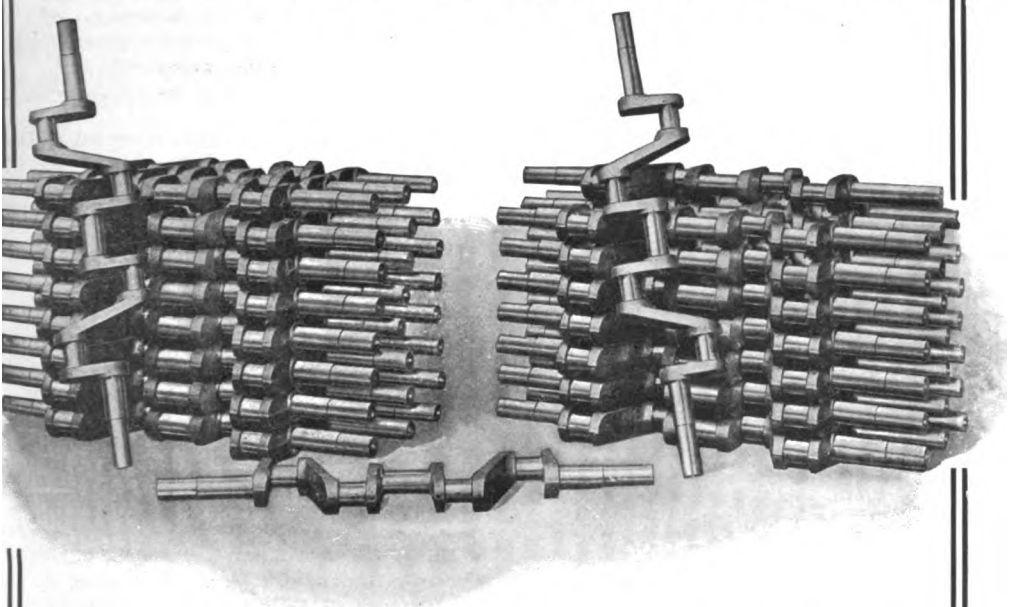
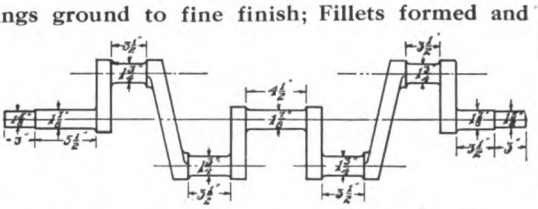
GRIND YOUR CRANK SHAFTS WITH

LANDIS CRANK GRINDING MACHINES



Nickel Steel Forgings; All bearings ground to fine finish; Fillets formed and finished by grinding wheel, to gauge fit.

1/32″ Dia removed
Variation limit .00025″



AVERAGE GRINDING TIME 2 HOURS

The above shafts were ground on our No. 24 Crank Grinder, which has face plate mechanism, by which exact length of throw and accurate relative pin positions are insured.

Let us send your our Crank Grinder circular or catalog describing our full line of cylindrical grinding machines

Landis Tool Company

Waynesboro, Pa.

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HAMMERS (Continued)

POWER HAMMERS (Continued)

BLISS Co., E. W., Brooklyn, N. Y.

BRADLEY & Son, C. C., Syracuse, N. Y.

CHAMPION—See Beaudry & Co.

DIENELT & Eisenhardt, Philadelphia, Pa.

GRINNELL Mfg. Co., Grinnell, Ia.

JUSTICE & Co., P. S., Philadelphia, Pa.

McLANE, J. B., North Reading, Mass.

MACGOWAN & Finigan Foundry & Machine Co., St. Louis, Mo. "Perfect."

MAYER Bros., Mankato, Minn.

MERRILL Bros. Co., Maspeth, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

NOVELTY Iron Works, Dubuque, Ia.

PERFECT—See Macgowan & Finigan Foundry & Machine Co.

SCRANTON & Co., New Haven, Conn.

TOLEDO Machine & Tool Co., Toledo, O.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WILLIAMS, White & Co., Moline, Ill.

STEAM HAMMERS

ALLIANCE Machine Co., Alliance, O.

CHAMBERSBURG Engineering Co., Chambersburg, Pa.

ERIE Foundry Co., Erie, Pa.

LANE Tool Co., Cleveland, O.

McDOUGALL & Potter Co., New York, N. Y.

MORGAN Engineering Co., Alliance, O.

NILES-BEMENT-POND Co., New York, N. Y.

SELLERS & Co., Wm., Philadelphia, Pa.

HANDLES

FILE AND TOOL HANDLES

BLISS Mfg. Co., R., Pawtucket, R. I.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

NIAGARA Handle & Ferrule Co., Buffalo, N. Y.

OHIO Tool Co., Columbus, O.

OSGOOD, J. L., Buffalo, N. Y.

PIQUA Handle & Mfg. Co., Piqua, O.

SANDUSKY Tool Co., Sandusky, O.

UNION Hardware Co., Torrington, Conn.

HOLDERS

LATHE AND PLANER TOOL HOLDERS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BOWN Machine Co., Battle Creek, Mich.

CARR Bros., Syracuse, N. Y.

CHAMPION—See Western Tool & Mfg. Co.

COLTON Combination Tool Co., East Hampton, Mass.

FAIRBANKS Co., Springfield, O. "United States."

HILL Standard Mfg. Co., Anderson, Ind.

MINGST, C. P., Evansville, Ind.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

TAIT—See Van Doren Mfg. Co.

UNITED STATES—See Fairbanks Co.

VAN DOREN Mfg. Co., Chicago, Ill. "Tait."

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

INDICATORS

SPEED INDICATORS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Son, Edward, Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

GRANT Mfg. & Machine Co., Bridgeport, Conn. "Tabor."

MIXTER Saw Tool Co., J. W., Plymouth, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

TABOR—See Grant Mfg. & Machine Co.

VEEDER, Mfg. Co., Hartford, Conn.

WOODMAN Mfg. & Supply Co., R., Boston, Mass.

IRONS

TUYERE IRONS

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

ARCADE Mfg. Co., Freeport, Ill.

BALL—See Comstock, Geo. S.

BOYNTON & Plummer, Worcester, Mass.

COMSTOCK, Geo. S., Mechanicsburg, Pa. "Fish," "Ball."

FISH—See Comstock, Geo. S.

HUNTSVILLE Foundry & Machine Works, Huntsville, Ala.

Complete Index to Classification appears on Pages 7 to 18.

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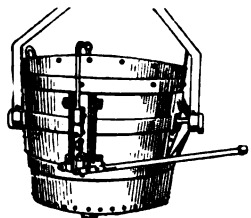
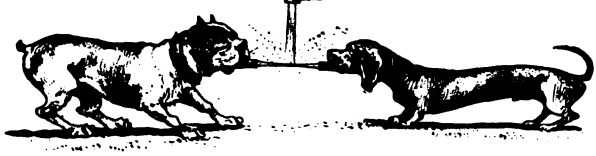
Automobile Steel Castings

made by our improved methods in ACID OPEN HEARTH STEEL Manufacture renders it possible to run a Steel lower in the elements than has heretofore been accomplished for this class of work,



the result being a STRONGER, BETTER STEEL — always reliable and uniform. Axles are cast by us that are practically INDESTRUCTIBLE.



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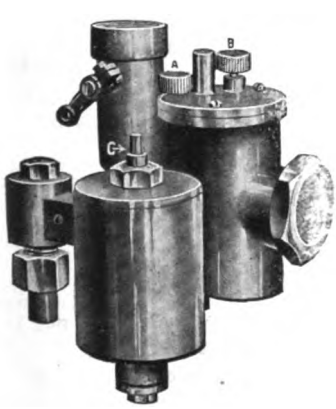

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Embodies a new principle that gives greater *flexibility* and *power* with less fuel than heretofore obtained from the ordinary carbureter. It also starts the engine easier and runs it cooler.

We offer 30 days' trial and if not satisfactory return it and we will refund.

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IRONS (Continued)

TUYERE IRONS (Continued)

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

NATIONAL Novelty Corp., New York, N. Y.

SWETT Iron Works, A. L., Medina, N. Y.

WAGNER Mfg. Co., Sidney, O.

JIGS

UNIVERSAL JIGS

FORTIN Tool Co., B. P., Woonsocket, R. I.

KETTLES

SODA AND POTASH KETTLES

BROWN & Sharpe Mfg. Co., Providence, R. I.

GRAY & Prior Machine Co., 32 Suffield St., Hartford, Conn. (See page 305.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y. (See page 263.)

MANUFACTURERS' Equipment & Engineering Co., Boston, Mass.

KEYS

MACHINE KEYS

AKRON Machine Co., Akron, O.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

STANDARD Gauge Steel Co., Beaver Falls, Pa.

WHITNEY Mfg. Co., Hartford, Conn, "Woodruff." (See page 463.)

WOODRUFF—See Whitney Mfg. Co.

KNURLS

KNURLING WHEELS

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

WELCH & Co., Thomas F., Boston, Mass.

LACQUERS

METAL LACQUERS

AMERICAN Lacquer Co., Bridgeport, Conn.

BARRETT & Co., M. L., Chicago, Ill.

EGYPTIAN Lacquer Mfg. Co., New York, N. Y.

MAAS & Waldstein Co., New York, N. Y.

NIKOLAS & Co., G. J., Chicago, Ill.

ZINSSER & Co., W., New York, N. Y.

LATHES

BENCH OR PRECISION LATHES

AMERICAN Watch Tool Co., Waltham, Mass.

CATARACT—See Hardinge Bros.

ELGIN Tool Works, Elgin, Ill.

GOODELL-PRATT Co., Greenfield, Mass.

HARDINGE Bros., Chicago, Ill. "Cataract."

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

RIVETT Lathe Mfg. Co., Brighton, Boston, Mass. (See page 331.)

SCHUCHARDT & Schutte, West St. Bldg. New York, N. Y. (See page 347.)

SLOAN & Chace Mfg. Co., Newark, N. J.

STARK Tool Co., Waltham, Mass.

VAN NORMAN—See Waltham Watch Tool Co.

WALTHAM Machine Works, Waltham, Mass.

WALTHAM Watch Tool Co., Springfield Mass. "Van Norman."

BUFFING LATHES

(See Machines, Buffing and Polishing)

CRANK PIN LATHES

BOGERT, John L., Flushing, N. Y.

TINDEL-MORRIS Co., Eddystone, Pa.

ENGINE LATHES

AMERICAN Tool Works Co., Cincinnati, O.

BARNES Drill Co., Rockford, Ill.

BRADFORD Machine Tool Co., Cincinnati, O.

BULLARD Machine Tool Co., Bridgeport, Conn.

CARROLL-JAMIESON Machine Tool Co., Batavia, O.

CHAMPION Tool Works Co., Cincinnati, O.

CINCINNATI Lathe & Tool Co., Cincinnati, O.

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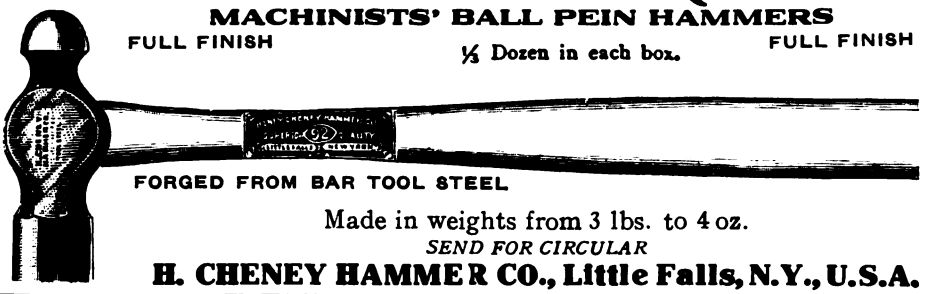
MACHINISTS' BALL PEIN HAMMERS

FULL FINISH ½ Dozen in each box. FULL FINISH



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One Piece Drop Forging. No Welds. The Strongest Front Axle Offered to the Trade. Manufacturers using Our Axles have never had a complaint nor a repair. We offer quality not price. They are neither cheap nor excessive—but right, quality considered. Steering Knuckles and Steering Arms for same. Also Drop Forgings.

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Worcester Pressed Steel Company

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FORGE WORK OF ALL KINDS

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JOLIET FORGE CO. — JOLIET, ILL.

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LATHES (Continued)

ENGINE LATHES (Continued)

DAVIS Machine Co., W. P., Rochester, N. Y.

DETRICK & Harvey Machine Co., Baltimore, Md.

FAIRBANKS Co., Springfield, O.

FAY & Scott, Dexter, Me.

FITCHBURG Machine Works, Fitchburg, Mass.

FLATHER & Co., Nashua, N. H.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GREAVES, Klusman & Co., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HENDEY Machine Co., Torrington, Conn.

JOHNSON, Jr., Co., Israel H., Philadelphia, Pa.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MIAMI Valley Machine Tool Co., Dayton, O.

MILWAUKEE Machine Tool Co., Milwaukee, Wis.

MORRIS Foundry Co., John B., Cincinnati, O. "Schellenbach."

NEW Haven Mfg. Co., New Haven, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

PRENTICE Bros Co., Worcester, Mass.

PUTNAM Machine Co., Fitchburg, Mass.

RAHN-CARPENTER Co., Cincinnati, O.

REED Co., F. E., Worcester, Mass.

ROBBINS Machine Co., Worcester, Mass.

ROCKFORD Drilling Machine Co., Rockford, Ill.

SCHELLENBACH—See Morris Foundry Co.

SCHUMACHER & Boye, Cincinnati, O.

SEBASTIAN Lathe Co., Cincinnati, O.

SENECA Falls Mfg. Co., Seneca Falls, N. Y.

SHEPARD Lathe Co., Cincinnati, O.

SPRINGFIELD Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

VON Wyck Machine Tool Co., Cincinnati, O.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

POLISHING LATHES

(See Machines, Buffing and Polishing)

PRECISION LATHES

(See Lathes, Bench or Precision)

TURRET LATHES

AMERICAN Tool Works Co., Cincinnati, O.

AMERICAN Tool & Machine Co., Boston, Mass.

BARDONS & Oliver, Cleveland, O.

BOGERT, John L., Flushing, N. Y.

BRADFORD Machine Tool Co., Cincinnati, O.

BROWN & Sharpe Mfg. Co., Providence, R. I

BULLARD Machine Tool Co., Bridgeport, Conn.

CARTER & Hakes Machine Co., Winsted, Conn. (See page 303.)

DAVIS Machine Co., W. P., Rochester, N. Y.

DRESES Machine Tool Co., Cincinnati, O.

FOSTER-KIMBALL Machine Co., Elkhart, Ind.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GISHOLT Machine Co., Madison, Wis.

HAMILTON Machine Tool Co., Hamilton, O.

HARTNESS—See Jones & Lamson Machine Co.

INTERNATIONAL Machine Tool Co., Indianapolis, Ind. "Libby."

JONES & Lamson Machine Co., Springfield, Vt. "Hartness."

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LIBBY—See International Machine Tool Co.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MASSEY Machine Co., Watertown, N. Y.

MERIDEN Machine Tool Co., Meriden, Conn.

NATIONAL Machine Co., Milwaukee, Wis.

NILES-BEMENT-POND Co., New York, N. Y.

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

PRENTICE Bros. Co., Worcester, Mass.

RAHN-CARPENTER Co., Cincinnati, O.

REED Co., F. E., Worcester, Mass.

SCHUMACHER & Boye, Cincinnati, O.

SMURR & Kamen Machine Co., Chicago, Ill.

SPRINGFIELD Machine Tool Co., Springfield, O.

STEINLE Turret Machine Co., Madison, Wis.

WARNER & Swasey Co., Cleveland, O.

WELLS & Son Co., F. E., Greenville, Mass.

WOOD Turret Machine Co., Chicago, Ill.

WOODWORKING LATHES

AMERICAN Sawmill Machinery Co., Hackettstown, N. J.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

CORDESMAN-RECHTIN Co., Cincinnati, O

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

FAY & Scott, Dexter, Me.

FOX Machine Co., Grand Rapids, Mich.

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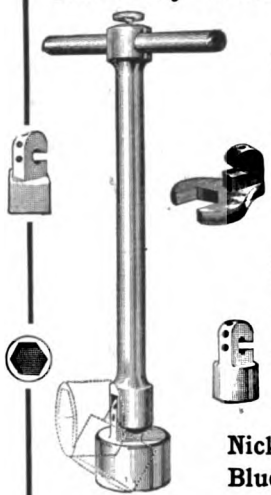
The Only Wrench For Auto Owners



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The Handy Wrench for unhandy places.

Instantaneous Any Position

Set consists of 8 sockets to take bolts and nuts from ¼ to ⅝ inches inclusive.

Spark plug ⅞, 1 or 1⅛ inch as desired.

All case-hardened steel.

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THE PERFECTION WRENCH

Instantly adjusted.
Easily and quickly operated.
Immense time, trouble and temper saver.
Positive grip.

Indispensable to automobilists
Best "all around" tool ever offered for sale.
Must be seen to be appreciated,
"You'll want one when you see it."

For circular, address

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LATHES (Continued)

WOODWORKING LATHES (Continued)

GREAVES, Klusman & Co., Cincinnati, O.
HOLMES Machinery Co., E. B., Buffalo, N. Y.
OBER Mfg. Co., Chagrin Falls, O.
OLIVER Machinery Co., Grand Rapids, Mich.
PORTER, C. O. & A. D., Grand Rapids, Mich.
POWER & Co., L., Philadelphia, Pa.
ROBBINS Machine Co., Worcester, Mass.
SMITH Machine Co., H. B., Smithville, N. J.
TREVOR Mfg. Co., Lockport, N. Y.

LETTERS

PATTERN LETTERS

BENSKIN Mfg. Co., Canton, O. "Perfect."
BRIM, A. W., Seneca Falls, N. Y.
BUTLER, A. G., New York, N. Y.
CLEVELAND Fillet Co., Cleveland, O.
CLEVELAND Galvanizing Works Co., Cleveland, O.
DIAMOND Clamp & Flask Co., Richmond, Ind.
EVERETT & Son, A., Auburn, N. Y.
KNIGHT & Son, H. W., Seneca Falls, N. Y.
PERFECT—See Benskin Mfg. Co.
SHANAFELT Mfg. Co., Canton, O.
TIMMIS & Clissold, Bound Brook, N. J.

LEVELS

SPIRIT LEVELS

ATHOL Machine Co., Athol, Mass.
CHAPIN-STEPHENS Co., Pine Meadow, Conn.
DAVIS & Cook, Watertown, N. Y.
DISSTON & Sons, Henry, Philadelphia, Pa.
GOODELL-PRATT Co., Greenfield, Mass.
KEUFFEL & Esser Co., New York, N. Y.
SAWYER Tool Mfg. Co., Fitchburg, Mass.
STANLEY Rule & Level Co., New Britain, Conn.
STARRETT Co., L. S., Athol, Mass.
STRATTON Level Co., Greenfield, Mass.

MACHINES

BEADING MACHINES

(See Machines, Crimping and Beading)

BOLT HEADING MACHINES

ACME Machinery Co., Cleveland, O.
AJAX Mfg. Co., Cleveland, O.
BROWN Co., H. B., East Hampton, Conn.
BURDICT—See Howard Iron Works.
COOK Co., Asa S., Hartford, Conn.
HOWARD Iron Works, Buffalo, N. Y. "Burdict."
NATIONAL Machinery Co., Tiffin, O.
NEW Doty Mfg. Co., Jamesville, Wis.
NILES-BEMENT-POND Co., New York, N. Y.
PAWTUCKET Mfg. Co., Pawtucket, R. I.

BOLT POINTING MACHINES

ACME Machinery Co., Cleveland, O.
BROWN Co., H. B., East Hampton, Conn.
BURDICT—See Howard Iron Works.
COOK Co., Asa S., Hartford, Conn.
DETRICK & Harvey Machine Co., Baltimore, Md.
HOWARD Iron Works, Buffalo, N. Y. "Burdict."
NATIONAL Machinery Co., Tiffin, O.
NILES-BEMENT-POND Co. New York, N. Y.
PAWTUCKET Mfg. Co., Pawtucket, R. I.
PRATT & Whitney Co., Hartford, Conn. (See page 301.)

BOLT THREADING MACHINES

ACME Machinery Co., Cleveland, O.
BROWN Co., H. B., East Hampton, Conn.
BURDICT—See Howard Iron Works.
COOK Co., Asa S., Hartford, Conn.
DETRICK & Harvey Machine Co., Baltimore, Md.
FOOTE-BURT Co., Cleveland, O. "Reliance."
GREEN RIVER—See Wiley & Russell Mfg. Co.
HERCULES—See Reece Co.
HOWARD Iron Works, Buffalo, N. Y. "Burdict.'
LANDIS Machine Co., Waynesboro, Pa.
LITTLE GIANT—See Wells Bros. Co.
MUMMERT, Wolfe & Dixon Co., Hanover, Pa.
NATIONAL Machinery Co., Tiffin, O.
NILES-BEMENT-POND Co., New York, N. Y.
PAWTUCKET Mfg. Co., Pawtucket, R. I.
PRATT & Whitney Co., Hartford, Conn. (See page 301.)
REECE Co., E. F., Greenfield, Mass. "Hercules."
RELIANCE—See Foote-Burt Co.
WEBSTER & Perks Tool Co., Springfield, O.
WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)
WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River."

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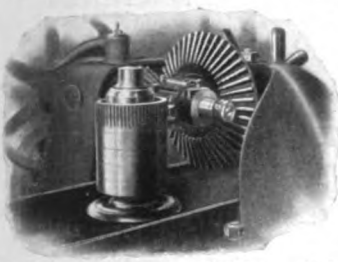

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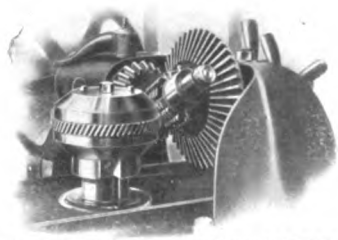
OF ALL KINDS



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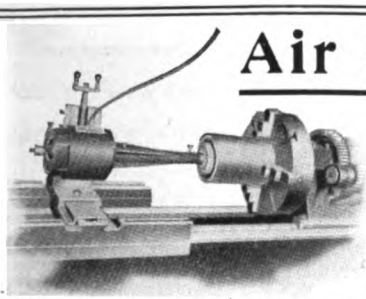

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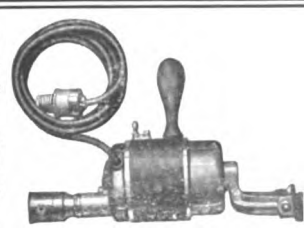

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BINSSE Machine Co., Newark, N. J.

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EPSEN-LUCAS Machine Works, Philadelphia, Pa.

GISHOLT Machine Co., Madison, Wis.

LUCAS Machine Tool Co., Cleveland, O.

NEWTON Machine Tool Works, Philadelphia, Pa.

NILES-BEMENT-POND Co., New York, N. Y.

SELLERS & Co., Wm., Philadelphia, Pa.

WARNER & Swasey Co., Cleveland, O.

BORING MACHINES

(Vertical)

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BULLARD Machine Tool Co., Bridgeport, Conn.

COLBURN Machine Tool Co., Franklin, Pa.

GISHOLT Machine Co., Madison, Wis.

KING Machine Tool Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

ROCKFORD Drilling Machine Co., Rockford, Ill.

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BLOUNT Co., J. G., Everett, Mass.

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

BUILDERS Iron Works, Providence, R. I.

FOX Machine Co., Grand Rapids, Mich.

GARLAND—See Sibley-Houfley Machine Co.

OLIVER Mfg. Co., W. W., Buffalo, N. Y.

RANSOM Mfg. Co., Oshkosh, Wis.

ST. LOUIS Machine Tool Co., St. Louis, Mo.

SIBLEY-HOUFLEY Machine Co., Detroit, Mich. "Garland."

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WEBSTER & Perks Tool Co., Springfield, O.

CAM CUTTING MACHINES

MANVILLE Bros. Co., Waterbury, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STANDARD Machinery Co., Providence, R. I.

CRIMPING AND BEADING MACHINES

AMERICAN Can Co., Chicago, Ill.

KEENE & Co., Geo. C., Cincinnati, O.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

SWAINE Mfg. Co., Fred J., St. Louis, Mo.

CUTTING-OFF MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

HURLBUT-ROGERS Machine Co., S. Sudbury, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

FILING MACHINES

HARTFORD—See Robinson Tool Works.

ROBINSON Tool Works, Waterbury, Conn. "Hartford."

SIMPLEX Mfg. Co., New York, N. Y.

GEAR CUTTING MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Shaper Co., Cincinnati, O. (See page 343.)

DWIGHT Slate Machine Co., Hartford, Conn.

FELLOWS Gear Shaper Co., 24 Pearl St., Springfield, Vt. (See page 453.)

FLATHER Mfg. Co., E. J., Nashua, N. H. (See page opposite.)

GLEASON Works, Rochester, N. Y.

GOULD & Eberhardt, Newark, N. J.

GRANT-LEES Machine Co., Cleveland, Ohio. (See page 343.)

NEWARK Gear Cutting Machine Co., Newark, N. J.

NEWTON Machine Tool Works, Philadelphia, Pa.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SLOANE & Chace Mfg. Co., Newark, N. J.

STANDARD Mfg. Co., Bridgeport, Conn.

WHITON Machine Co., D. E., New London, Conn.

GEAR HOBBING MACHINES

ADAMS, Co., Dubuque, Iowa.

GOULD & Eberhardt, Newark, N. J.

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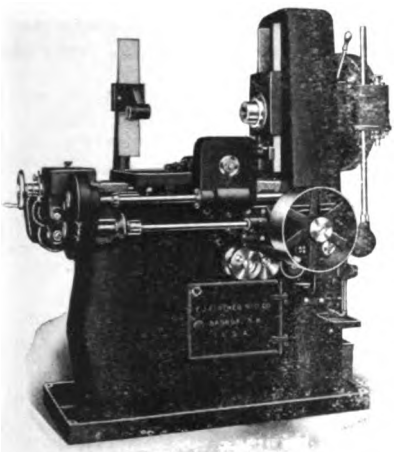
Automatic Gear Cutting MACHINES



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MACHINES (Continued)

GEAR HOBBING MACHINES (Continued)

GRANT-LEES Machine Co., Cleveland, O. (See page 343.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page opposite.)

GEAR TOOTH CHAMFERING MACHINES

HATCHER Auto Parts Co., Cleveland, O.

LONG Arm System Co., Cleveland, O. (See page 93.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page opposite.)

KEY SEATING MACHINES

BAKER Bros., Toledo, O.

BURR & Sons, John T., Brooklyn, N. Y.

DAVIS Machine Co., W. P., Rochester, N. Y.

MITTS & Merrill, Saginaw, Mich.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

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BECKER Milling Machine Co., Hyde Park, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CARTER & Hakes Machine Co., Winsted, Conn. (See page 303.)

CINCINNATI Milling Machine Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

HENDEY Machine Co., Torrington, Conn.

INGERSOLL Milling Machine Co., Rockford, Ill.

KEARNEY & Trecker Co., Milwaukee, Wis.

KEMPSMITH Mfg. Co., Milwaukee, Wis.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

OESTERLEIN Machine Co., Cincinnati, O.

OWEN Machine Tool Co., Springfield, O.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page opposite.)

SELLERS & Co., Wm., Philadelphia, Pa. more, Md.

NUT FACING MACHINES

DETRICK & Harvey Machine Co., Baltimore, Md.

VICTOR Tool Co., Waynesboro, Pa. (See page 349.)

NUT-TAPPING MACHINES

ACME Machinery Co., Cleveland, O.

AUTOMATIC Machine Co., Bridgeport, Conn. "Coulter."

BROWN Co., H. B., East Hampton, Conn.

COULTER—See Automatic Machine Co.

DETRICK & Harvey Machine Co., Baltimore, Md.

HOWARD Iron Works, Buffalo, N. Y. "Schlenker."

LANDIS Machine Co., Waynesboro, Pa.

LITTLE GIANT—See Wells Bros. Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

REECE Co., E. F., Greenfield, Mass.

SCHLENKER—See Howard Iron Works.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

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(See Machines, Buffing and Polishing)

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GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

NILES-BEMENT-POND Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page opposite.)

RIM FORMING AND ROLLING MACHINES

BLAKE & Johnson Co., Waterbury, Conn.

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GRANT Mfg. & Machine Co., Bridgeport, Conn.

HUBBELL, Harvey, Bridgeport, Conn.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

SHUSTER Co., F. B., New Haven, Conn.

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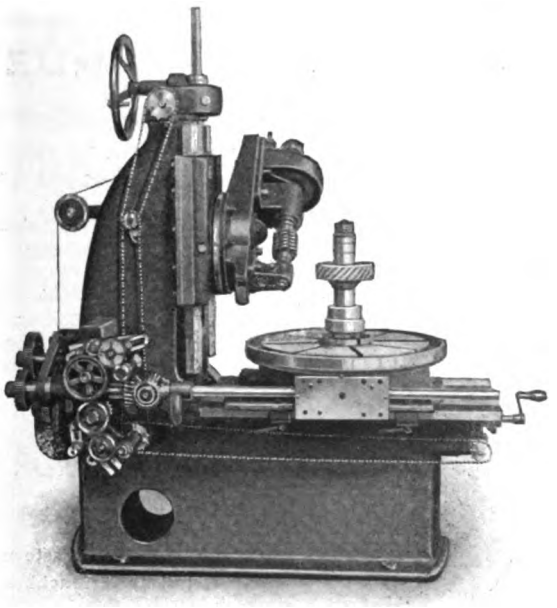
For Spur, Worm and Spiral Gears



The gears cut on our Automatic Gear Hobbing Machines are always correct. The teeth are of equal thickness and have the correct form.

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No. 0	cuts gears up to	8 inches	Diameter	8 D.P.
No. ½	cuts gears up to	12 inches	Diameter	6 D.P.
No. 1	cuts gears up to	22 inches	Diameter	4 D.P.
No. 2	cuts gears up to	30 inches	Diameter	3 D.P.
No. 3	cuts gears up to	44 inches	Diameter	2 D.P.

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PAXSON-WARREN—See Paxson Co.

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BROWN & Sharpe Mfg. Co., Providence, R. I.

DAVIS Sewing Machine Co., Dayton, O.

CLEVELAND Automatic Machine Co., Cleveland, O.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 481.)

MACK Mfg. Co., F. A., Jersey City, N. J.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page opposite and 231.

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

UNIVERSAL Machine Screw Co., Hartford, Conn.

WINDSOR Machine Co., Windsor, Vt.

SPRING COILING MACHINES

BAIRD Machine Co., Oakville, Conn.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

HOEFER—See Wells, Frank L.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

WELLS, Frank L., Kenosha, Wis. "Hoefer."

SPRING TESTING MACHINES

COULTER & McKenzie Machine Co., Bridgeport, Conn.

TAPPING MACHINES

BAKER Bros., Toledo, O.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GRANT Mfg. & Machine Co., Bridgeport, Conn.

HARTFORD Machine Screw Co., Hartford, Conn.

HUBBELL, Harvey, Bridgeport, Conn.

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

ST. LOUIS Machine Tool Co., St. Louis, Mo.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

UPHOLSTERY TUFTING MACHINES

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WOODEN MALLETS

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HELLENBERG & Son, J. B., Coldwater, Mich.

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SANDUSKY Tool Co., Sandusky, O.

UNION Hardware Co., Torrington, Conn.

MANDRELS

EXPANDING MANDRELS

CHAMPION—See Western Tool & Mfg. Co.

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LECOUNT, Wm. G., S. Norwalk, Conn.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

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WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

METERS

CUT METERS

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

WARNER Instrument Co., 341 Wheeler Ave., Beloit, Wis. (See page 221.)

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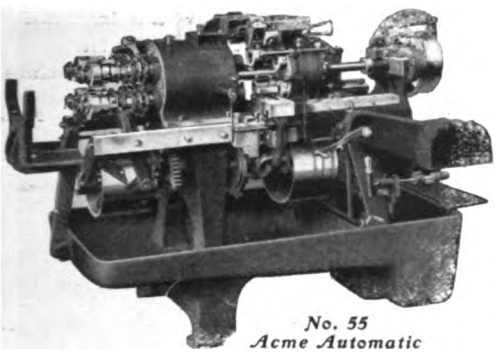
THE ACME AUTOMATIC

Multiple Spindle Screw Machine



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SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SLOCOMB Co., J. T., Providence, R. I.

SMITH Co., E. G., Columbia, Pa.

STARRETT Co., L. S., Athol, Mass.

OVENS

CORE BAKING OVENS

BLODGETT Co., G. S., Burlington, Vt.

BYRAM & Co., Detroit, Mich.

CULLEN-ATKINSON Co., Hartford, Conn.

FALLS Rivet & Machine Co., Cuyahoga Falls, O. "Wadsworth."

HILL & Griffith Co., Cincinnati, O.

MILLETT Core Oven Co., Springfield, Mass.

OVEN Equipment & Mfg. Co., Stamford, Conn.

WADSWORTH—See Falls Rivet & Machine Co.

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OVEN Equipment & Mfg. Co., Stamford, Conn.

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BOSTON—See American Glue Co.

BROOKLYN—See Behr & Co.

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NEW ENGLAND—See American Glue Co.

UNION—See American Glue Co.

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TAPER PINS

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MORSE Twist Drill & Machine Co., New Bedford, Mass.

PERRY-FAY Mfg. Co., Elyria, O.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

ST. LOUIS Screw Co., St. Louis, Mo.

STANDARD Tool Co., Cleveland, O.

WESTERN Automatic Machine Screw Co., Elyria, O.

WORCESTER Machine Screw Co., Worcester, Mass.

PLANERS

METAL PLANERS

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BETTS Machine Co., Wilmington, Del.

CHANDLER Planer Co., Ayer, Mass.

CINCINNATI Planer Co., Cincinnati, O.

CINCINNATI Shaper Co., Cincinnati, O. (See page 343.)

CLEVELAND Planer Works, Cleveland, O.

DETRICK & Harvey Machine Co., Baltimore, Md.

FLATHER Planer Co., Mark, Nashua, N. H.

GRAY Co., G. A., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HARRINGTON Son & Co., Edwin, Philadelphia, Pa.

NEW HAVEN Mfg. Co., New Haven, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

OHIO Machine Tool Co., Kenton, O.

POWELL Tool Co., Worcester, Mass.

PUTNAM Machine Co., Fitchburg, Mass.

ROCKFORD Machine Tool Co., Rockford, Ill.

SELLERS & Co., Wm., Philadelphia, Pa.

STAPF & Co., John B., Dunkirk, N. Y.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WILSON Machine Co., W. A., Rochester, N. Y.

WOODWARD & Powell Planer Co., Worcester, Mass.

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AMERICAN Woodworking Machinery Co., Rochester, N. Y.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati O.

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HALL & Brown Woodworking Machine Co., St. Louis, Mo.
HERMANCE Machine Co., Williamsport, Pa.
OLIVER Machinery Co., Grand Rapids, Mich.
POWER & Co., L., Philadelphia, Pa.
PRYIBIL, P., New York, N. Y.
SMITH Machinery Co., H. B., Smithville, N. J.
TREVOR Mfg. Co., Lockport, N. Y.
WHITE Co., John A., Dover, N. H.
WHITNEY & Son, Baxter D., Winchendon, Mass.
WOODS Machine Co., S. A., Boston, Mass.
YERKES & Finan Woodworking Machine Co., St. Louis, Mo.

PLANES

WOODWORKERS PLANES

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CHAPLINS—See Tower & Lyon Co.
GAGE Tool Co., Vineland, N. J.
MACK & Co., Rochester, N. Y.
OHIO Tool Co., Columbus, O.
SANDUSKY Tool Co., Sandusky, O.
SARGENT & Co., New Haven, Conn.
STANLEY Rule & Level Co., New Britain, Conn.
TOWER & Lyon Co., New York, N. Y. "Chaplins."

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DIAMOND Clamp & Flask Co., Richmond, Ind.
OLIVER Machinery Co., Grand Rapids, Mich.
PERFECT—See Benskin Mfg. Co.
SHANAFELT Mfg. Co., Canton, O.
SMITH Foundry Supply Co., J. D., Cleveland, O. "Cleveland."
TIMMIS & Clissold, Bound Brook, N. J.

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(See Taps and Dies)

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BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.
CRESCENT Tool Co., Jamestown, N. Y. "Simplex."
CINCINNATI Tool Co., Norwood, O. "Hargraves."
CRONK & Carrier Mfg. Co., Elmira, N. Y.
DANIELSON & Co., J. P., Jamestown, N. Y.
DICKE Tool Co., Downers Grove, Ill.
ERIE Tool Works, Erie, Pa.
HALL Co., Chas. E., Buffalo, N. Y. (See page opposite.)
HARGRAVES—See Cincinnati Tool Co.
KILBORN & Bishop Co., New Haven, Conn.
KING & Co., J. M., Waterford, N. Y.
KRAEUTER & Co., Newark, N. J.
LOWENTRAUT Mfg. Co., P., Newark, N. J. "U. S."
OSWEGO Tool Co., Oswego, N. Y.
PECK, Stow & Wilcox Co., Southington, Conn.
REED Mfg. Co., Erie, Pa.
SCHOLHORN Co., Wm., New Haven, Conn. "Bernard."
SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)
SIMPLEX—See Crescent Tool Co.
STORTZ & Son, John, Philadelphia, Pa.
U. S.—See Lowentraut Mfg. Co.
UTICA Drop Forge & Tool Co., Utica, N. Y.
VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.
VICTOR—See Bonner Mfg. Co.

GAS PLIERS

(See Pliers, Combination)

POSTS

TOOL POSTS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

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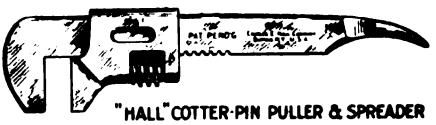
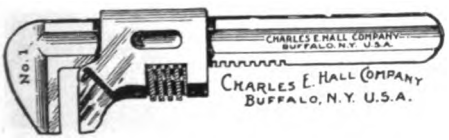
"S" Adjustable Wrenches

Five sizes each Nut and Pipe. Do away with open-end wrenches in your Repair Kit and use our 8 in. size. Saves **money** and **weight.**

Cotter Pin Puller, Spreader and Adjustable Wrench Combined

Costs less than separate tools and lessens weight of your kit.





Automobile Straight Adjustable Wrenches

5 in. 5½ in., 7 in., 9 in. and 11½ in sizes, with pry. All finishes.

Improved Combination Pliers

6 and 8 in. sizes—all finishes. Ask to see our mottled finish; it will appeal to you.

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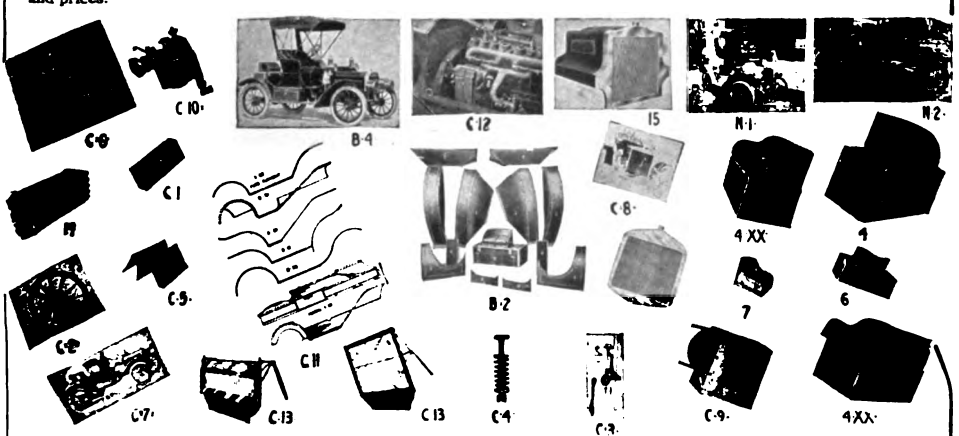
Charles E. Hall Company, Buffalo, N. Y.

Manufacturers, Dealers, Owners

Here is a line of parts we manufacture that will appeal to you. Look over the list and write us for catalogue and prices.



C–6 Runabout top.
C–10 Carbureter.
B–4 Remodeled Ford Runabout outfit.
C–12 Hercules magneto.
15 Hood and imitation cooler.
N–1 N–2 Rebuilt Ford Runabout outfit.
14 Coil radiator.
C–4 Special tool and battery box.
C–11 Fenders and running boards.
B–2 Outfit to convert Ford Runabout to Roadster.
C–8 Front springs for Ford.
4–xx Double divided trunk and rumble seat.
4– No. 4 Rumble seat and trunk.
C–2 Brakes.
C–5 Folding hood for Ford.
C–7 Ford Roadster from B–2 outfit.
C–13 Arco Glass Fronts.
C–4 Valve adjusting lock nuts for Ford
C–3 Commutator Bracket for Ford.
C–9 Special oiler for Ford.
–7 Rumble seat.
6 Rumble seat and trunk.
Vertical Radiator.
All our parts made for **any car.**

AUTO REBUILDING CO. - - - - 1249 Michigan Ave., Chicago, Ill.

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PRESSES

ARBOR PRESSES

BARNES Co., W. F. & John, Rockford, Ill.

BARTLETT, Edwin E., Boston, Mass.

KING Machine Tool Co., Cincinnati, O.

LUCAS Machine Tool Co., Cleveland, O.

NILES-BEMENT-POND Co., New York, N. Y.

WILMARTH & Morman Co., Grand Rapids, Mich.

BROACHING PRESSES

BLISS Co., E. W., Brooklyn, N. Y.

BURR & Sons, J. T., Brooklyn, N. Y.

LAPOINTE Machine Tool Co., Hudson, Mass.

PERKINS Machine Co., Warren, Mass.

STANDARD Machinery Co., Providence, R. I.

POWER PRESSES

ADRIANCE Machine Works, Brooklyn, N. Y.

ALLIANCE Machine Co., Alliance, O.

ATLAS Machine Co., Waterbury, Conn.

BLAKE & Johnson Co., Waterbury, Conn.

BLISS Co., E. W., Brooklyn, N. Y.

CADY Machine Co., Cleveland, O.

CLEVELAND Punch & Shear Works, Cleveland, O.

CONSOLIDATED Press & Tool Co., Hastings, Mich.

COULTER & McKenzie Machine Co., Bridgeport, Conn.

FERRACUTE Machine Co., Bridgeton, N. J.

HIBBARD Mfg. Co., Wm. H., Brooklyn, N. Y.

LEFFLER & Co., Chas., Brooklyn, N. Y.

LONG & Allstatter Co., Hamilton, O.

MANVILLE Bros. Co., Waterbury, Conn.

MANVILLE Machine Co., E. J., Waterbury, Conn.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND, Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

SPRINGFIELD Machine Tool Co., Springfield, O.

STANDARD Machinery Co., Providence, R. I.

TOLEDO Machine & Tool Co., Toledo, O.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WATERBURY Machine Co., Waterbury, Conn.

WHEELER & Son, Frank, Meriden, Conn.

PULLERS

COTTER PIN PULLERS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CARVER Tool Works, Spring Valley, N. Y.

ESSEX Mfg. & Supply Co., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

MOUND Tool & Scraper Co., 708 Howard St., St. Louis, Mo.
(See page opposite.)

NOONAN Tool & Machine Works, A. S., Rome, N. Y.

CRANK PIN OR FLYWHEEL PULLERS

CRANE Puller, Boston, Mass.
(See page 447.)

SCHWEPPE & Wilt, Detroit, Mich.

WEEBER Mfg. Works, C. F., Albany, N. Y.

PUNCHES

PUNCHES AND SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BLISS Co., E. W., Brooklyn, N. Y.

BUFFALO Forge Co., Buffalo, N. Y.

CINCINNATI Punch & Shear Co., Cincinnati, O.

CLEVELAND Punch & Shear Works Co., Cleveland, O.

FERRACUTE Machine Co., Bridgeton, N. J.

KEENE & Co., Geo. C., Cincinnati, O.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

LONG & Allstatter Co., Hamilton, O.

MITTS & Merrill, Saginaw, Mich.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PERKINS Machine Co., Warren, Mass.

QUEEN City Punch & Shear Co., Cincinnati, O.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y.
(See page 347.)

TOLEDO Machine & Tool Co., Toledo, O

WILLIAMS, White & Co., Moline, Ill.

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SMITHICKS POINTED BELT HOOKS

"JUST-RYT" - "AGRICULTURAL" - "AUTOMOBILE" ASSORTMENTS "SACO" SPRING COTTERS

BUY "SACO" SPRING COTTERS

knowing that

Cotters of "S & Co." Standard are Matchless, therefore Profitable Sellers.
Only the Best Material is used, Guaranteeing Service and Satisfaction.
They are made by Up-to-date machinery coupled with skilled labor.
Turned out slowly, insuring uniform lengths and well-shaped heads.
Every Cotter well pointed (English or American) for easy starting.
Rumbled and packed in boxes of Regular or Assorted Sizes, best
Suited to the requirement of Hardware, Automobile, Agricultural Trade.

F. P. SMITH & COMPANY

114 Railroad Avenue, Manufacturers, Sharon Hill, Pennsylvani

MOUND TOOLS

For the Automobile

Cut represents our new set of 20 tools gotten up for use in auto repair work. Strictly high-grade tools with all the good points of tool-smithing in their make-up.

Conveniently arranged in finished oak case, and every tool is highly polished and guaranteed.

No. 1.	Set of 20 Tools	$4.50
No. 22.	Set of 6 Mound Hollow Ground Scraping Tools, Oak Case . .	3.00
No. 25.	Set of 3 Carbon Scrapers . . .	2.50

end for Circular B

MOUND TOOL AND SCRAPER COMPANY, Toolsmiths
708 Howard Street, ST. LOUIS, MO., U. S. A.

We Make All Kinds
Both Small and
Medium Weight
WORKMANSHIP
ABSOLUTELY
HIGH
CLASS

CRUCIBLE STEEL CASTINGS

PROMPT
DELIVERIES

MAYNARD STEEL FOUNDRY CO.
710-716 Reed St.
MILWAUKEE, WIS.

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PUNCHES (Continued)

ARCH AND WASHER PUNCHES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

KRAEUTER & Co., Newark, N. J.

CENTER AND PRICK PUNCHES

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich. (See page 307.)

BEALL Bros., Alton, Ill.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CARVER Tool Works, Spring Valley, N. Y.

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DEUSE, J. S., Chester, Conn.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

GOODELL-PRATT Co., Greenfield, Mass.

JOHNSON, Wm., Newark, N. J.

KEYSTONE Mfg. Co., Buffalo, N. Y.

KRAEUTER & Co., Newark, N. J.

MAYHEW Co., H. H., Shelburne Falls, Mass.

NATIONAL Cutlery Co., Detroit, Mich.

PECK, Stow & Wilcox Co., Southington, Conn.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

WELCH Co., Thomas F., Boston, Mass.

PORTABLE HAND PUNCHES

AMERICAN Lock Nut Co., Oregon, Ill. "Lightning."

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

BUFFALO Forge Co., Buffalo, N. Y.

EXCELSIOR Tool & Machine Co., E. St. Louis, Ill. "Little Giant."

EVANSVILLE Tool Works, Evansville, Ind.

GEM Tool Works, Brooklyn, N. Y. "Sampson."

KIDDER Mfg. Co., J. F., Burlington, Vt.

LIGHTNING—See American Lock Nut Co.

LITTLE GIANT—See Excelsior Tool & Machine Co.

MARVEL—See Armstrong-Blum Mfg. Co.

QUEEN City Punch & Shear Co., Cincinnati, O.

SAMPSON—See Gem Tool Works.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

PRICK PUNCHES

(See Punches, Center and Prick)

WASHER PUNCHES

(See Punches, Arch and Washer)

PYROMETERS

ADVANCE—See Wilson-Maeulen Co.

AMERICAN Steam Gauge & Valve Mfg. Co., Boston, Mass.

ASHCROFT Mfg. Co., New York, N. Y.

BRISTOL Co., New York, N. Y.

BROWN & Son, Edward, Philadelphia, Pa.

DIXON Co., H. L., Pittsburg, Pa.

DU VIVIER, Ernest H., New York, N. Y (Importer.)

LE CHATELIER—See Wilson-Maeulen Co.

QUEEN & Co., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

THWING, C. B., Philadelphia, Pa.

UEHLING Instrument Co., Passaic, N. J.

WILSON-MAEULEN Co., New York, N. Y. "Advance," "Le Chatelier."

ZAUBITZ, August, New York, N. Y.

REAMERS

STANDARD AND ADJUSTABLE REAMERS

BALDWIN Steel Co., New York, N. Y. "Hudson."

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRUBAKER & Bros., W. L., Millersburg, Pa.

CELFOR Tool Co., Chicago, Ill.

CLOUGH, R. M., Tolland, Conn.

CLEVELAND Twist Drill Co., Cleveland, O. "Paradox," "Peerless."

DETROIT Twist Drill Co., Detroit, Mich.

DIAMOND—See Whitman & Barnes Mfg. Co.

GISHOLT Machine Co., Madison, Wis.

GREEN RIVER—See Wiley & Russell Mfg. Co.

HERCULES—See Reece Co.

HUDSON—See Baldwin Steel Co.

KING & Co., J. M., Waterford, Conn.

LAPOINTE Machine Tool Co., Hudson, Mass.

LITTLE GIANT—See Wells Bros. Co.

McCROSKY Reamer Co., Meadville, Pa.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PARADOX—See Cleveland Twist Drill Co.

PEERLESS—See Cleveland Twist Drill Co.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

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REAMERS (Continued)

STANDARD AND ADJUSTABLE REAMERS (Continued)

REECE Co., E. F., Greenfield, Mass. "Hercules."

ROGERS Works, John M., Gloucester City, N. J.

SCHELLENBACK-HUNT Tool Co., Cincinnati, O.

SMITH Co., Wm. J., New Haven, Conn.

STANDARD Tool Co., Cleveland, O.

STAPF & Co., John B., Dunkirk, N. Y.

WELLS Bros. Co., Greenfield, Mass. (See page 367.)

WHITMAN & Barnes Mfg. Co., Chicago, Ill. "Diamond."

WILEY & Russell Mfg. Co., Greenfield, Mass.

RIDDLES

FOUNDRY RIDDLES AND SIEVES

BUFFALO Wire Works Co., Buffalo, N. Y.

DARBY & Sons Co., Edward, 218 Arch St., Philadelphia, Pa. (See page 349.)

DEAN & Co., Hy. E., Worcester, Mass.

TAYLOR & Dean, Pttsburg, Pa.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

ROLLS

BENDING AND STRAIGHTENING ROLLS

ATLAS Machine Co., Waterbury, Conn.

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BETTS Machine Co., Wilmington, Del.

CINCINNATI Punch & Shear Co., Cincinnati, O.

KANE & Roach, Syracuse, N. Y.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

QUEEN City Punch & Shear Co., Cincinnati, O.

WHITING Co., Geo., Chicago, Ill.

RULES

STEEL RULES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

DISSTON & Sons, Henry, Philadelphia, Pa.

GOODELL-PRATT Co., Greenfield, Mass.

KEUFFEL & Esser Co., New York, N. Y.

LUFKIN Rule Co., Saginaw, Mich.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

WYKE & Co., J., Boston, Mass.

SANDERS

WOOD SANDERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

SMITH Machine Co., H. B., Smithville, N. J.

WHITE Co., John A., Dover, N. H.

SAWS

BAND SAWING MACHINES

AMERICAN Saw Mill Machinery Co., Hackettstown, N. J.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GOODSPEED Machine Co., Winchendon, Mass.

GREAVES, Klusman & Co., Cincinnati, O.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

ROOT Co., B. M., York, Pa.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

WHITE Co., John A., Dover, N. H.

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HEDGELAND AUTO AXLE EQUALIZER

(1) Gives a positive drive to both wheels.

(2) Absolutely prevents Pivotal Skidding.

(3) Furnishes a positive and uniform braking effort to both wheels.

(4) Increases the life of tires 50 per cent.

(5) Any car is a handicapped cripple on bad cr sandy roads without it, regardless of its rated power.

(6) There is safety, satisfactiсn and economy in this device. Better write us to-day.

HEDGELAND MFG. CO.

CANTON, OHIO

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SAWS (Continued)

CIRCULAR SAW TABLES

AMERICAN Saw Mill Machinery Co., Hackettstown, N. J.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BAKER Bros., Toledo, O.

BEACH, H. W., Montrose, Pa.

COLLADAY, Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

HAYES Machine Co., Kingston, N. Y.

HEMINGWAY & Son, John, Lynn, Mass.

HERMANCE Machine Co., Williamsport, Pa.

HOLMES Machinery Co., E. B., Buffalo, N. Y.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

POWER & Co., L. Philadelphia, Pa.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

U. S. Machine Co., Williamsport, Pa.

YERKES & Finan Woodworking Machine Co., St. Louis, Mo.

COLD SAW CUTTING-OFF MACHINES

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

BIRDSBORO Steel Foundry & Machine Co., Birdsboro, Pa.

BURR & Sons, John T., Brooklyn, N. Y.

COCHRANE-BLY Co., Rochester, N. Y.

ESPEN-LUCAS Machine Works, Philadelphia, Pa.

HIGH Duty Saw & Tool Co., Eddystone, Pa.

HIGLEY Machine Co., New York, N. Y.

HOEFER Mfg. Co., Freeport, Ill.

LEA Equipment Co., New York, N. Y.

NEWTON Machine Tool Works, Philadelphia, Pa.

NUTTER & Barnes Co., Boston, Mass.

PRATT & Whitney Co., Hartford, Conn.
(See page 301.)

QUINCY - MANCHESTER - SARGENT Co., Plainfield, N. J.
(See page 377.)

WILMARTH & Morman Co., Grand Rapids, Mich.

HAND SAWS

(Rip and Cross Cut)

ATKINS & Co., E. C., Indianapolis, Ind.

BISHOP & Co., Geo. H., Lawrenceburg, Ind.

CENTRAL Hardware Co., Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

SIMONDS Mfg. Co., Fitchburg, Mass.

POWER HACK SAWS

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

DAYTON Machine Works, Dayton, O.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

GLOBE—See West Haven Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

HOEFER Mfg. Co., Freeport, Ill.

MARVEL—See Armstrong-Blum Mfg. Co.

MILLER'S Falls Co., 30 Warren St., New York, N. Y.
(See page opposite.)

RACINE Gas Engine Co., Racine, Wis.

ROBERTSON Mfg. Co., Buffalo, N. Y.

STAR—See Millers Falls Co.

STERLING—See Diamond Saw & Stamping Works.

STORY, H. T., Chicago, Ill.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNIVERSAL—See West Haven Mfg. Co.

WEST Haven Mfg. Co., New Haven, Conn. "Universal," "Globe."

SWING SAWS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BADGER State Machine Co., Janesville, Wis.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CONNELL & Dengler Machine Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

FAY & Egan Co., J. A., Cincinnati, O.

FISHER Machine Works, E., Chicago, Ill.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

HERMANCE Machine Co., Williamsport, Pa.

LOVELL Machine Works, Gardner, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

U. S. Machine Co., Williamsport, Pa.

WHITE Co., John A., Dover, N. H.

YERKES & Finan Woodworking Machinery Co., St. Louis, Mo.

HOT SAWS

BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.)

LEWIS Foundry & Machine Co., Pittsburg, Pa.

INSERTED TOOTH SAWS

DISSTON & Sons, Henry, Philadelphia, Pa. "Royal," "Monarch," "Premier."

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STAR

Hack Saw Machine

Cuts up to 4½ ins. in diameter and adapts itself to all kinds of work. Takes care of itself when making cut, and stops when the work is done. No tool that we have ever made has given better satisfaction.

Price, $25.00

Millers Falls Co., 30 Warren St., New York

ABSOLUTE SAFETY

Acquired by using our Safety Non-Explosive Devices which are practical, reliable and meet all requirements. The 1-quart Priming Can (see cut) and 5-gallon Garage or Storage Can, also Tank Equipments for Autos, Storages, etc., merit attention.

Prices Right. For information, address

The American Safety Appliance Company

210 Centre Street, New York City

We desire a few State Representatives

Keep Your Money

At home. Why ship Automobile Wheels four, five or six hundred miles to have the **tires filled** when you can have a **Tire Filling Plant** right in your own city? **We furnish machinery** and the best guaranteed **Tire Filler** ever placed on the market—the **great TIREASE** (improved)—under the direct supervision of L. C. Lazear, formerly secretary and treasurer of the Auto-Tire Filler Company, and the designer of the machines adopted and used by this company in filling tires.

With our equipment, upon an investment of a few hundred dollars, you can easily clear from $100 to $500 per week, depending upon the number of automobiles within your territory.

WE GRANT EXCLUSIVE RIGHTS

This is a demonstrated, wonderfully popular and growing business, one that will stick with you and grow in exact proportion to the growth and popularity of the automobile. It cannot be beaten for a small investment. Write for particulars to-day. Remember the "early bird," etc.

AUTO TIRE FILLING MACHINERY CO.
47-92 La Salle St., CHICAGO

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SAWS (Continued)

INSERTED TOOTH SAWS (Continued)

MONARCH—See Disston & Sons.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

PREMIER—See Disston & Sons.

ROYAL—See Disston & Sons.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor-Newbold."

TAYLOR-NEWBOLD—See Tabor Mfg. Co.

SCRAPERS

BEARING SCRAPERS

BRAUNSDORF-MUELLER Co., Elizabeth, N. Y.

KRAEUTER & Co., Newark, N. J.

LUTZ—See Western Tool & Mfg. Co.

MOUND Tool & Scraper Co., 708 Howard St., St. Louis, Mo. (See page 355.)

WESTERN Tool & Mfg. Co., Springfield, O. "Lutz."

SCRIBERS

MACHINISTS SCRIBERS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

SETS

RIVET SETS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CARVER Tool Works, Spring Valley, N. Y.

DREW & Co., C., Kingston, N. Y.

KRAEUTER & Co., Newark, N. J.

PECK, Stow & Wilcox Co., Southington, Conn.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

SHAPERS

METAL SHAPERS

AMERICAN Tool Works Co., Cincinnati, O.

BARKER & Co., Wm. A., Cincinnati, O.

BOYNTON & Plummer, Worcester, Mass.

CINCINNATI Shaper Co., Cincinnati, O. (See page 343.)

FLATHER Planer Co., Mark, Nashua, N .H.

GOULD & Eberhardt, Newark, N. J.

HAMILTON Machine Tool Co., Hamilton, O.

HENDEY Machine Co., Torrington, Conn.

JUENGST & Sons, Geo., Croton Falls, N. Y.

KELLY Co., R. A., Xenia, O.

LUTTER & Gies, Milwaukee, Wis. "Milwaukee."

MILWAUKEE—See Lutter & Gies.

NEW HAVEN Mfg. Co., New Haven, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

OHIO Machine Tool Co., Kenton, O.

POTTER & Johnston Machine Co., Pawtucket, R. I.

QUEEN City Machine Tool Co., Cincinnati, O.

ROCKFORD Machine Tool Co., Rockford, Ill.

SELLERS & Co., Wm., Philadelphia, Pa.

SMITH & Mills Co., Cincinnati, O.

SPRINGFIELD, Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

STEPTOE Shaper Co., John, Cincinnati, O.

STOCKBRIDGE Machine Co., Worcester, Mass.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WOOD SHAPERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

SMITH Machine Co., H. B., Smithville, N. J.

WHITNEY & Son, Baxter D., Winchendon, Mass.

SHARPENERS

FILE SHARPENERS

AMERICAN File Sharpener Co., New York, N. Y.

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SHAVES

SPOKE SHAVES

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

CINCINNATI TOOL Co., Norwood, O. "Hargraves."

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVES—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

OHIO Tool Co., Columbus, O.

STANLEY Rule & Level Co., New Britain, Conn.

SHEARS

LEVER SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

FARREL Foundry & Machine Co., Ansonia, Conn.

NATIONAL Machinery Co., Tiffin, O.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NOVELTY Iron Works, Dubuque, Ia.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PECK, Stow & Wilcox Co., Southington, Conn.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WAY-WALKER Machine Co., Lansing, Mich.

SHOVELS

MOLDERS SHOVELS

BEALL Bros., Alton, Ill.

PFEIFER & Co., John, Philadelphia, Pa.

PITTSBURG Shovel Co., Pittsburg, Pa.

WOOD Shovel & Tool Co., Piqua, O.

SLOTTERS

SCREW SLOTTERS

DAVIS Sewing Machine Co., Dayton, O.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

GRANT Mfg. & Machine Co., Bridgeport, Conn.

MANVILLE Machine Co., E. J., Waterbury, Conn.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See pages 231 and 349.)

SNIPS

METAL SNIPS OR SHEARS

ACME Shear Co., Bridgeport, Conn. "Ajax." "Star."

AJAX—See Acme Shear Co.

CLAUSS Shear Co., Fremont, O.

HEINISCH'S Sons Co., R., Newark, N. J.

NATIONAL Cutlery Co., Philadelphia, Pa.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STAR—See Acme Shear Co.

STORTZ & Son, John, Philadelphia, Pa.

WISS & Sons Co., J., Newark, N. J.

SOLDER

ALUMINUM SOLDER

ALUMINUM Solder & Refining Co., Oswego, N. Y., "Alumunite."

ALUMUNITE—See Aluminum Solder & Refining Co.

ARROW—See Lester Co.

CITY Brass Foundry Co., Cleveland, O. (See page 363.)

CLEVELAND Block Co., Cleveland, O.

CLUM & Atkinson, Rochester, N. Y. (See page opposite.)

INTERNATIONAL Solder Co., 102 W. Fayette St., Syracuse, N. Y. (See page 363.)

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Richards."

LESTER Co., E. F., Fayetteville, N. Y. "Arrow."

LUMEN Bearing Co., Buffalo, N. Y.

RICHARDS—See Janney, Steinmetz & Co.

THWING, C. B., Philadelphia, Pa.

HALF AND HALF SOLDER

BLATCHFORD Co., E. W., Chicago, Ill.

COLUMBIA Smelting & Refining Works, Brooklyn, N. Y.

GARDINER Metal Co., Chicago, Ill.

LUMEN Bearing Co., Buffalo, N. Y.

MERCHANT & Evans Co., Philadelphia, Pa. (See page 327.)

NATIONAL Lead Co., New York, N. Y.

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SOLDER (Continued)

HALF AND HALF SOLDER (Continued)

SOLDERINE Co., Boston, Mass.

SYRACUSE Smelting Works, New York, N. Y.

TAYLOR Co., N. & G., Philadelphia, Pa.

WILDES, Thomas, New York, N. Y.

SQUARES

MACHINISTS SQUARES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

DISSTON & Sons, Henry, Philadelphia, Pa.

GOODELL-PRATT Co., Greenfield, Mass.

SARGENT & Co., New Haven, Conn.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

STAMPS

STEEL STAMPS

(For numbering or lettering parts)

CHANDLER Co., Springfield, Mass. (See page opposite.)

HANSON, C. H., Chicago, Ill.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

MONOGRAM Crest & Sign Co., New York, N. Y.

MURDOCK, Jr., Co., Jas., Cincinnati, O.

NESS, Jr., Geo. M., New York, N. Y.

NEW YORK Stencil Works, New York, N. Y.

QUINT & Sons, S. H., Philadelphia, Pa.

ROBBINS Mfg. Co., John, Boston, Mass.

SACKMAN, W. L., Akron, O.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STANDS

PORTABLE TOOL STANDS

NEW BRITAIN Machine Co., New Britain, Conn. (See page 305.)

WESTERN Tool & Mfg. Co., Springfield, O.

STOCKS

DIE STOCKS

ARMSTRONG Mfg. Co., 295 Knowlton St., Bridgeport, Conn. (See page 373.)

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 369.)

BAY State Tap & Die Co., Mansfield, Mass. (See page 369.)

BESLY & Co., Chas. H., Chicago, Ill.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass. "Diamond."

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CONANT & Donelson, Greenfield, Mass. "Reliable."

DIAMOND—See Card Mfg. Co.

ECONOMY—See Wells & Son Co.

HART Mfg. Co., Cleveland, O.

HOLROYD & Co., Waterford, N. Y.

KING & Co., J. M., Waterford, N. Y.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

LOWELL Wrench Co., Worcester, Mass. (See page 373.)

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

REECE Co., E. F., Greenfield, Mass.

RELIABLE—See Conant & Donelson.

ROBBINS, Gamewell & Co., Pittsfield, Mass.

THISTLE—See Winter Bros. Co.

WELCH & Co., Thomas F., Boston, Mass.

WELLS & Son Co., F. E., Greenfield, Mass. "Economy."

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page opposite.)

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."

WINTER Bros. Co., Wrentham, Mass. "Thistle."

SWAGES

TOP AND BOTTOM SWAGES

(See Fullers and Swages)

TAPES

MEASURING TAPES

KEUFFEL & Esser Co., New York, N. Y.

LUFKIN Rule Co., Saginaw, Mich.

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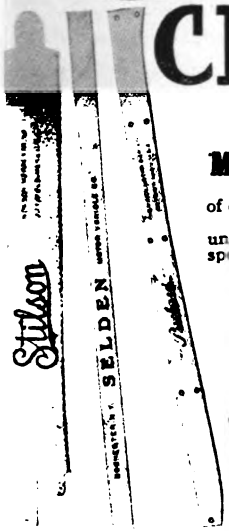

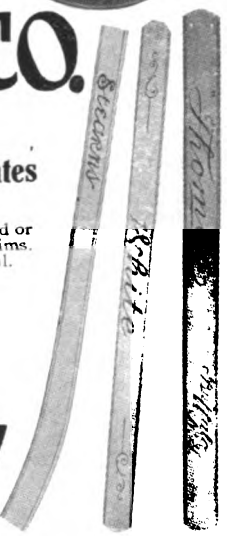

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TAPES (Continued)

MEASURING TAPES (Continued)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

STARRETT Co., L. S., Athol, Mass.

TAPS

TAPS AND DIES

ADAMANTINE—See American Tap & Die Co.

AMERICAN Tap & Die Co., Greenfield, Mass. "Adamantine." (See page opposite.)

BAY State Tap & Die Co., Mansfield, Mass. (See page opposite.)

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CONANT & Donelson, Greenfield, Mass. "Reliable."

HERCULES—See Reece Co.

HOLROYD & Co., Waterford, N. Y.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

RELIABLE—See Conant & Donelson.

REECE Co., E. F., Greenfield, Mass. "Hercules."

SMART Mfg. Co., A. J., Greenfield, Mass. (See page opposite.)

STANDARD Tool Co., Cleveland, O.

THISTLE—See Winter Bros. Co.

VICTOR Tool Co., Waynesboro, Pa. (See page 349.)

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."

WINTER Bros. Co., Wrentham, Mass. "Thistle."

TOOLS

LATHE AND PLANER TOOLS

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich. (See page 307.)

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

CARR Bros., Syracuse, N. Y.

CHAMPION—See Western Tool & Mfg. Co.

HILL Standard Mfg. Co., Anderson, Ind.

JOHNSON—See Pratt & Whitney Co.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

RHODES—See Pratt & Whitney Co.

STORTZ & Son, John, Philadelphia, Pa.

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

WOODBRIDGE—See Pratt & Whitney Co.

MOLDERS TOOLS

BARNETT Foundry Co., Oscar, Newark, N. J.

BURRS Damascus Tool Works, Detroit, Mich.

DISSTON & Sons, Henry, Philadelphia, Pa.

DOBSON, Wm., Canastota, N. Y.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., Philadelphia, Pa.

PENINSULAR Tool & Specialty Co., Detroit, Mich.

PLANER TOOLS

(See Tools, Lathe and Planer)

PNEUMATIC TOOLS

BLISS Co., E. W., Brooklyn, N. Y.

CHICAGO Pneumatic Tool Co., Chicago, Ill.

CLEVELAND Pneumatic Tool Co., Cleveland, O.

DAYTON Pneumatic Tool Co., Dayton, O.

HELWIG Mfg. Co., St. Paul, Minn.

INDEPENDENT Pneumatic Tool Co., Chicago, Ill.

INGERSOLL-RAND Co., New York, N. Y.

OLDHAM & Son Co., George, Philadelphia, Pa.

PITTSBURG Pneumatic Co., Canton, O.

STANDARD Railway Equipment Co., St. Louis, Mo.

THREADING TOOLS

BOSTON Tool Co., Cambridge, Mass.

RIVETT Lathe Mfg. Co., Boston, Mass. (See page 331.)

GEOMETRIC Tool Co., New Haven, Conn.

TORCHES

GASOLINE TORCHES AND FURNACES

ACORN Brass Mfg. Co., Chicago, Ill.

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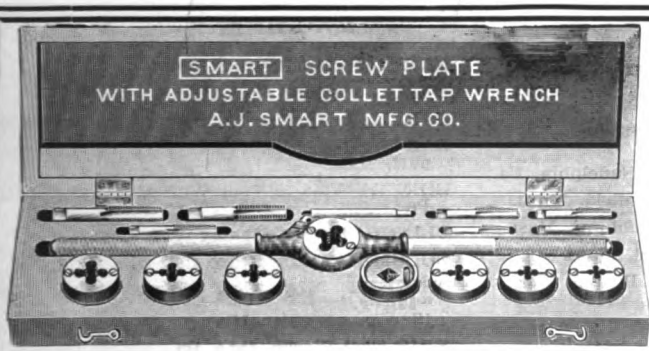

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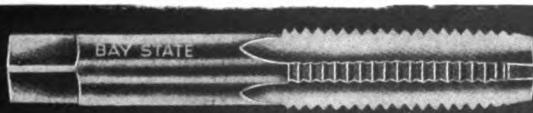

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TORCHES (Continued)

GASOLINE TORCHES AND FURNACES (Continued)

AMERICAN Stove Co. (Ringen Div.), St. Louis, Mo.

BARTHEL Blow Lamp Co., Boston, Mass.

BEST Light Co., Canton, O.

BRIDGEPORT Brass Co., 253 Broadway, New York, N. Y. (See page 215.)

CLAYTON & Lambert Mfg. Co., Detroit, Mich.

GEFRORER & Sons, C., Philadelphia, Pa.

GLOBE Brass Works, Detroit, Mich.

HOLLAND, Wm., Chicago, Ill.

HULL Mfg. Co., J. S., Baltimore, Md.

IMP—See Mossberg Co.

KNAPP Mfg. Co., New York, N. Y.

MOSSBERG Co., Frank, Attleboro, Mass. "Imp."

QUADRIGA Mfg. Co., Chicago, Ill. "Walters."

RESERVE Foundry & Mfg. Co., Cleveland, O.

SCHNEIDER & Trenkamp Co., Cleveland, O.

TURNER Brass Works, Sycamore, Ill.

VOLCANO Torch & Mfg. Co., Erie, Pa.

WALTERS—See Quadriga Mfg. Co.

WELLINGTON Mfg. Co., New York, N. Y.

TRAMMELS

TRAMMEL POINTS

DISSTON & Sons, Henry, Philadelphia, Pa.

GOODELL-PRATT Co., Greenfield, Mass.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

WELCH & Co., Thomas F., Boston, Mass.

TRIMMERS

WOOD TRIMMERS

(Hand Power)

FOX Machine Co., Grand Rapids, Mich.

OLIVER Machinery Co., Grand Rapids, Mich.

VISES

DRILL PRESS VISES

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BOWN Machine Co., Battle Creek, Mich.

CARTER & Hakes Machine Co., Winsted, Conn. (See page 303.)

GRAHAM Mfg. Co., Providence, R. I.

HILL Standard Mfg. Co., Anderson, Ind.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

LITTLE GIANT—See Noyes Co.

MASSEY Vise Co., Chicago, Ill.

NOYES Co., B. B., Greenfield, Mass. "Little Giant."

SKINNER Chuck Co., New Britain, Conn.

TITUS Machine Works, Marion, O.

HAND VISES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

GOODELL-PRATT Co., Greenfield, Mass.

LOWELL Wrench Co., Worcester, Mass. (See page 373.)

MILLER'S Falls Co., 30 Warren St., New York, N. Y. (See page 361.)

PHOENIX Hardware Mfg. Co., Homer, N. Y.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

SMITH, Otis A., Rockfall, Conn.

SMITH & Hemenway Co., New York, N. Y.

MACHINISTS VISES

ANCHOR—See Prentiss Vise Co.

ATHOL Machine Co., Athol, Mass.

BARRETT Machine Tool Co., Meadville, Pa.

BARBOUR-STOCKWELL Co., Cambridgeport, Mass.

BONNEY Vise & Tool Works, Philadelphia, Pa.

CLINCHER—See Massey Vise Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa. "Tiger." (See page opposite.)

ERIE Tool Works, Erie, Pa.

FULTON Machine & Vise Co., Lowville, N. Y.

HOLLANDS Mfg. Co., Erie, Pa. "Keystone."

HOWARD Iron Works, Buffalo, N. Y.

KEYSTONE—See Hollands Mfg. Co.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Clincher," "Perfect," "Lightning."

MERRILL Bros., Maspeth, N. Y.

PARKER Co., Chas., Meriden, Conn. (See page opposite.)

PERFECT—See Massey Vise Co.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

PRENTISS Vise Co., New York, N. Y. "Anchor."

REED Mfg. Co., Erie, Pa.

ROCK Island Tool Co., Rock Island, Ill.

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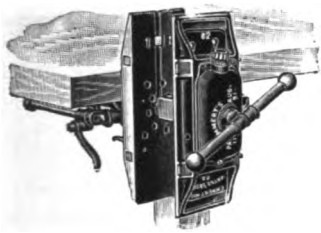

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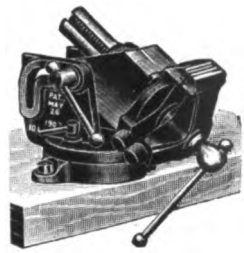

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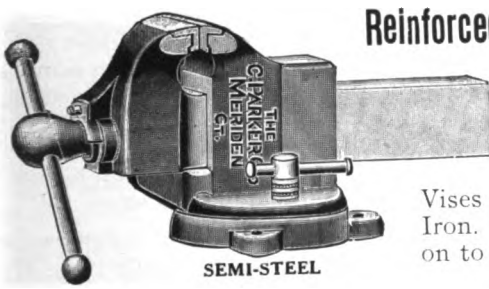

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VISES (Continued)

MACHINISTS VISES (Continued)

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

TIGER—See Emmert Mfg. Co.

WILLIAMSON Vise Co., Bradford, Pa.

YOST Mfg. Co., G. M., Meadville, Pa.

MILLING MACHINE VISES

CARTER & Hakes Machine Co., Winsted, Conn. (See page 303.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y. (See page 351.)

HENDEY Machine Co., Torrington, Conn.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

PATTERN MAKERS AND WOOD-WORKERS VISES

ABERNATHY Vise & Tool Co., Chicago, Ill.

ATHOL Machine Co., Athol, Mass.

BARBOUR-STOCKWELL Co., Cambridgeport, Mass. "Chandler & Washburn."

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BLAKE—See Prentiss Vise Co.

BONNEY Vise & Tool Works, Philadelphia, Pa.

CHANDLER & WASHBURN—See Barbour-Stockwell Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa. (See page 371.)

HOLLANDS Mfg. Co., Erie, Pa.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

OLIVER Machinery Co., Grand Rapids, Mich.

PARKER Co., Chas., Meriden, Conn. (See page 371.)

PRENTISS Vise Co., New York, N. Y. "Blake."

SHELDON & Co., E. H., Chicago, Ill.

TOLES Co., W. C., Chicago, Ill.

WALKER Machine Co., G. A., Boston, Mass.

WYMAN & Gordon Co., Worcester, Mass., & Cleveland, O. (See page 105.)

PIN VISES

(See inside front cover.) Conn. (See inside front cover.

BRAUNSDORF-MUELLER Co., **Elizabeth, N. J.**

FRAY & Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

LOWELL Wrench Co., Worcester, Mass. (See page opposite.)

STARRETT Co., L. S., Athol, Mass.

PIPE VISES

ARMSTRONG Mfg. Co., 295 Knowlton Ave., Bridgeport, Conn. (See page opposite.)

BONNEY Vise & Tool Works, Philadelphia, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CLIMAX—See Kemp Mfg. Co.

CURTIS & Curtis Co., Bridgeport, Conn.

EMMERT Mfg. Co., Waynesboro, Pa. (See page 371.)

ERIE Tool Works, Erie, Pa.

HOLLANDS Mfg. Co., Erie, Pa. "Keystone."

KEMP Mfg. Co., C. M., Baltimore, Md. "Climax."

KEYSTONE—See Hollands Mfg. Co.

LORD Co., L. L., Meadville, Pa. "Mead."

MARK Mfg. Co., Evanston, Ill.

MASSEY Vise Co., Chicago, Ill. "Perfect."

MEAD—See Lord Co.

OSWEGO Tool Co., Oswego, N. Y.

PARKER Co., Chas., Meriden, Conn. (See page 371.)

PERFECT—See Massey Vise Co.

PRENTISS Vise Co., New York, N. Y.

REED Mfg. Co., Erie, Pa.

SAUNDERS Sons, D., Yonkers, N. Y.

SCHUCHARDT & Schutte, West St. Bldg., New York, N. Y. (See page 347.)

WALWORTH Mfg. Co., Boston, Mass. (See page 345.)

WELLS & Son Co., F. E., Greenfield, Mass.

WILLIAMSON Vise Co., Bradford, Pa.

PLANER VISES

BROWN & Sharpe Mfg. Co., Providence, R. I.

DENISON Mfg. Co., Warren, O.

HENDEY Machine Co., Torrington, Conn.

HILL Standard Mfg. Co., Anderson, Ind.

MASSEY Vise Co., Chicago, Ill.

PRATT & Whitney Co., Hartford, Conn. (See page 301.)

SPECIAL PORTABLE VISES

BONNEY Vise & Tool Works, Philadelphia, Pa.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

ROCK Island Tool Co., Rock Island, Ill.

STERLING—See Windsor Mfg. Co.

WINDSOR Mfg. Co., Worcester, Mass. "Sterling."

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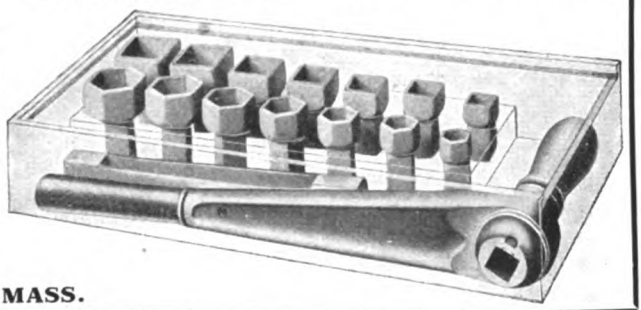

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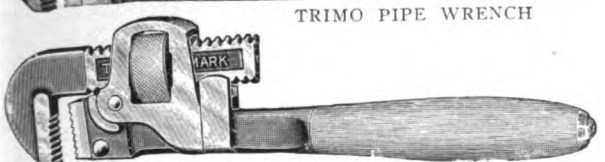

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BAY State Emery Wheel Co., Worcester, Mass.
(See page opposite.)
BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.
CARBORUNDUM Co., Niagara Falls, N. Y.
CORTLAND Corundum Wheel Co., Cortland, N. Y.
MONARCH Emery & Corundum Wheel Co., Camden, N. J.
NORTON Co., Worcester, Mass.
PENINSULAR Emery Wheel Co., Detroit, Mich.
PIKE Mfg. Co., Pike, N. H.
SAFETY Emery Wheel Co., Springfield, O.
STAR Corundum Wheel Co., Detroit, Mich.
SUPERIOR Corundum Wheel Co., Waltham, Mass.
VITRIFIED Wheel Co., Westfield, Mass.
WALTHAM Emery Wheel Co., Waltham, Mass.

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ABRASIVE Material Co., Philadelphia, Pa.
AMERICAN Emery Wheel Works, Providence, R. I.
BAY State Emery Wheel Co., Worcester, Mass.
(See page opposite.)
BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.
BUFFALO Emery Wheel Co., Buffalo, N. Y.
CHICAGO Wheel & Mfg. Co., Chicago, Ill.
DETROIT Emery Wheel Co., Detroit, Mich. "Hart."
ELECTRIC Emery Wheel Co., Newark, N. J.
LANCASTER Peerless Emery Wheel Co., Lancaster, Pa. "Peerless."
MONARCH Emery & Corundum Wheel Co., Camden, N. J.
NORTHAMPTON Emery Wheel Co., Leeds, Mass.
PEERLESS—See Lancaster Peerless Emery Wheel Co.
PENINSULAR Emery Wheel Co., Detroit, Mich.
PITTSBURG Emery Wheel Co., Pittsburg, Pa.
SAFETY Emery Wheel Co., Springfield, O.
SPRINGFIELD Mfg. Co., Bridgeport, Conn
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WALTHAM Emery Wheel Co., Waltham, Mass.

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(See Wheels, Buffing and Polishing)

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ALL-RIGHT Wrench Co., 1883 Dorchester Ave., Boston, Mass.
AMERICA Co., Momence, Ill. "Rockford," "Lightning."
AUTO-CLE — See Quincy-Manchester-Sargent Co.
BALL Tool Co., Boston, Mass.
BARNES Tool Co., New Haven, Conn.
BAY STATE—See Tudor Mfg. Co.
BEMIS & Call Hardware & Tool Co., Springfield, Mass.
BILLINGS & Spencer Co., Hartford, Conn.
(See inside front cover.

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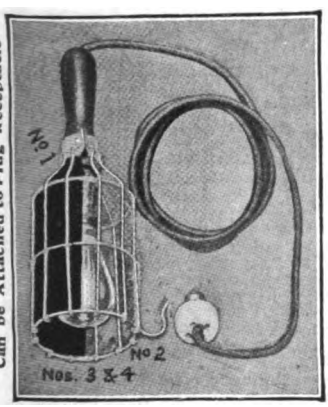

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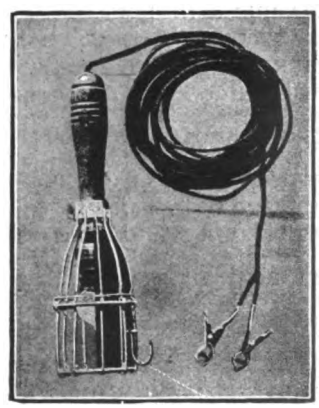

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BULLARD Automatic Wrench Co., Providence, R. I.

CHAMPION—See Syracuse Wrench Co.

COES Wrench Co., Worcester, Mass.

CRESCENT Forgings Co., Oakmont, Pa. "Rothweiler."

CRESCENT Tool Co., Jamestown, N. Y.

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DIAMOND—See Mossberg Co.

DUDLEY Mfg. Co., A., Menominee, Mich.

EDMONDS-METZEL Mfg. Co., Chicago, Ill. "Universal," "Perpetual."

ELLIS—See Offset Handle Wrench Co.

EMPIRE—See Hjorth Wrench Co.

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ESCO—See Erie Stamping & Mfg. Co.

FERRET—See Pedersen Mfg Co.

GRANGER'S Drop Forge Works, Chicago, Ill.

HALL Co., Chas. E., Buffalo, N. Y. (See page 353.)

HAMMOND Mfg. Co., Boston, Mass.

HARRIS & Reed Mfg. Co., Chicago, Ill.

HAWKEYE Wrench Co., Marshalltown, Ia.

HERBRAND Co., Fremont, Ohio.

HJORTH Wrench Co., Jamestown, N. Y. "Empire," "Lightning."

INDIANAPOLIS Drop Forging Co., Indianapolis, Ind.

KELLY, John, Chicago, Ill.

KEYSTONE Drop Forge Works, Chester, Pa.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Westcott."

KILBORN & Bishop Co., New Haven, Conn. "Saxon."

LAMSON & Sessions Co., Cleveland, O. "Buckeye."

LIGHTNING—See America Co.

LIGHTNING—See Hjorth Wrench Co.

LONG Wrench Co., J. R., Akron, O. "Quick."

LOWELL Wrench Co., Worcester, Mass. (See page 373.)

MASON Wrench & Tool Co., Chicago, Ill.

MONTE Wrench Co., Shelbyville, Ind.

MOSSBERG Co., Frank, Attleboro, Mass. "Sterling." "Diamond." "Alderman.

NEW BRITAIN Mfg. Co., New Britain, Conn. "Pick-Up."

NEW ENGLAND Forge Co., Worcester, Mass.

OFFSET Handle Wrench Co., Holland, Mich. "Ellis."

PAGE-STORMS Drop Forge Co., Chicopee, Mass. (See page 309.)

PEDERSEN Mfg. Co., New York, N. Y. "Ferret." (See page 171.)

PERFECT HANDLE—See Smith & Co.

PERFECTION Wrench Co., Port Chester, N. Y. (See page 341.)

PERPETUAL—See Edmonds-Metzel Mfg. Co.

PICK-UP—See New Britain Mfg. Co.

QUICK—See Long Wrench Co.

QUINCY - MANCHESTER - SARGENT Co., Plainfield, N. J. "Auto-Cle," "Titus-Cle." (See page opposite.)

REX Wrench Co., Boston, Mass. (See page 341.)

ROCKFORD—See America Co.

RICHARDS Mfg. Co., Aurora, Ill. "Wizard."

ROEBLINGS Sons Co., John A., Trenton, N. J.

ROTHWEILER—See Crescent Forgings Co.

SAXON—See Kilborn & Bishop Co.

SIMPLEX Mfg. Co., New York, N. Y. "Turn More."

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SMITH & Heminway, New York, N. Y.

SPENCER Wire Co., Worcester, Mass.

STERLING—See Mossberg Co.

SYRACUSE Wrench Co., Syracuse, N. Y. "Champion," "Yala." (See page opposite.)

TITUS-CLE—See Quincy - Manchester - Sargent Co.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., 55-71 Amory St., Roxbury, Mass. "Trimo." (See page 373.)

TUDOR Mfg. Co., Taunton, Mass. "Bay State." (See page 379.)

TURN MORE—See Simplex Mfg. Co.

UNIVERSAL—See Edmonds-Metzel Mfg. Co.

WAKEFIELD, J. E., Worcester, Mass.

WALDEN Mfg. Co., Worcester, Mass. (See page opposite.)

WESCOTT—See Keystone Mfg. Co.

WHITAKER Mfg. Co., Chicago, Ill. (See page opposite.)

WHITMAN & Barnes Mfg. Co., Chicago, Ill.

WILLIAMS & Co., J. H., Brooklyn, N. Y.

WIZARD—See Richards Mfg. Co.

WORCESTER Pressed Steel Co., Barbers Crossing, Mass. (See page 339.)

YALA—See Syracuse Wrench Co.

YEMCO—See York Electric & Machine Co.

YORK Electric & Machine Co., York, Pa. "Yemco."

PIPE WRENCHES

AMERICAN Drop Forging & Tool Co., Wayland, N. Y.

AMERICAN—See Warren Axe & Tool Co.

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 369.)

ARMSTRONG Mfg. Co., 295 Knowlton Ave., Bridgeport, Conn. (See page 373.)

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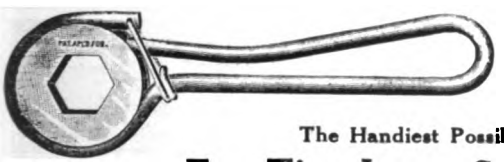

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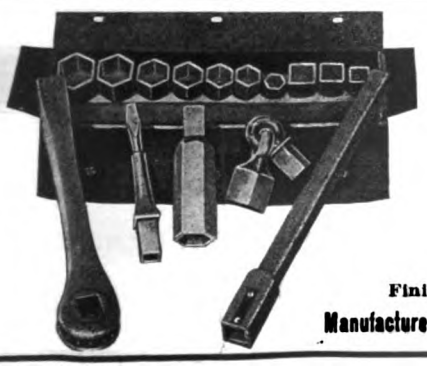

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PIPE WRENCHES (Continued)

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BONNER Mfg. Co., C. E., Chrisman, Ill. "Victor."

BULLARD Automatic Wrench Co., Providence, R. I.

EMPIRE—See Hjorth Wrench Co.

ERIE Tool Works, Erie, Pa.

HAWKEYE Wrench Co., Marshalltown, Ia.

HEADSON—See Ross Gear & Tool Co.

HJORTH Wrench Co., Jamestown, N. Y. "Empire."

INDIANAPOLIS Drop Forging Co., Indianapolis, Ind. "Tiger."

IRLAND Pipe Wrench Co., Boston, Mass.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Lowndes Duplex."

KEYSTONE Drop Forge Works, Chester, Pa.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Wescott."

KILBORN & Bishop Co., New Haven, Conn.

LEADER—See Ripley Pipe Wrench Co.

LOWNDES DUPLEX—See Janney, Steinmetz & Co.

OSWEGO Tool Co., Oswego, N. Y.

RIPLEY Pipe Wrench Co., Ripley, N. Y. "Leader."

ROSS Gear & Tool Co., Lafayette, Ind. "Headson."

SCHUCHARDT & Schultte, West St. Bldg., New York, N. Y. (See page 347.)

STILLSON—See Walworth Mfg. Co.

TIGER—See Indianapolis Drop Forging Co.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., 55-71 Amory St., Roxbury, Mass. "Trimo." (See page 373.)

VICTOR—See Bonner Mfg. Co.

WALWORTH Mfg. Co., Boston, Mass. "Stillson." (See page 345.)

WARREN Axe & Tool Co., Warren, Pa. "American."

WELLS & Son Co., F. E., Greenfield, Mass.

WESCOTT—See Keystone Mfg. Co.

TAP AND REAMER WRENCHES

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 369.)

ARMSTRONG Mfg. Co., 295 Knowlton Ave., Bridgeport, Conn. (See page 373.)

BASCOM—See Smart Mfg. Co.

BAY State Tap & Die Co., Mansfield, Mass. (See page 369.)

BESLY Co., Chas. H., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn. (See inside front cover.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L. Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass. "Handy," "Horsfield."

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I. "Nichols."

CONANT & Donelson, Greenfield, Mass. "Reliable."

GOODELL-PRATT Co., Greenfield, Mass.

GREEN RIVER—See Wiley & Russell Mfg. Co.

HANDY—See Card Mfg. Co.

HART Mfg. Co., Cleveland, O.

HERCULES—See Reece Co.

HOLROYD & Co., Waterford, N. Y.

HORSEFIELD—See Card Mfg. Co.

KEYSTONE Mfg. Co., Buffalo, N. Y.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NICHOLS—See Carpenter Tap & Die Co.

REECE Co., E. F., Greenfield, Mass. "Hercules."

RELIABLE—See Conant & Donelson.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SMART Mfg. Co., A. J., Greenfield, Mass. "Bascom." (See page 369.)

STANDARD Tool Co., Cleveland, O.

STARRETT Co., L. S., Athol, Mass.

WELCH & Co., Thomas F., Boston, Mass.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 367.)

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River," "Lightning."

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TABLES AND DATA FOR ENGINEERS

REFERENCE TABLES FOR INDICATED HORSEPOWER

It is often convenient to have a ready reference table, by the aid of which an immediate approximation to the horsepower of a motor can be made when the bore and stroke are known. Such a table has been prepared by Worby Beaumont, the well-known English engineer, who gave permission to the editor of *The Automobile Club Journal* in London to publish it. One table gives the ratings of engines with the cylinder dimensions in inches and fractions, and the other table gives the results with cylinders built to metric measurements. Of course, in a table of this sort, an arbitrary set of conditions as to revolutions, mean effective pressure and mechanical efficiency have to be assumed; those employed represent average practice and the table is not offered as a substitute for experimentation when the most accurate results are desired.

It will be noted from Table I that in a very small space the estimated indicated power of engines with bore and stroke dimensions varying from 2-in. bore and 2-in. stroke to 6-in. bore and 6 1-2-in. stroke is given. Similarly, in Table II, a similar series is given in metric measurement, covering sizes from 70 mm. bore and 70 mm. stroke to 150 mm. bore and 165 mm. stroke. In Table I there is a quarter of an inch difference of size of bore and stroke measurements between any two powers given, and in Table II a difference of 5 mm. In explanation of the tables, it will be seen that in column 1 the bore or cylinder diameter of the engine may be found, and in the columns to the right of this, commencing with the column headed 0, the power of the engine having that cylinder diameter and a stroke of the same dimension. Columns 3 to 10 in each table give the powers of engines of, for instance, the same bore, but having a stroke greater than the bore by the amount stated at the top of the column. For example, referring to Table I, an engine having a cylinder 4 inches in diameter and a stroke of 4 inches would develop, under conditions to be stated, 4.27 i.h.p., as shown in the column headed 0; that is, column 2. If, however, the engine has a cylinder bore of 4 inches and a stroke of 5 1-2 inches, then the power developed is as shown in column 8, 5.89 i.h.p.

Similarly, for example, referring to Table II, an engine having a bore and stroke of 100 mm. would give 4.09 i.h.p., and an engine with a cylinder 100 mm. diameter and 140 mm. stroke would give 5.72 i.h.p.

It will be observed that to each bore dimension in column 1, two horizontal lines are given. The first of these gives the calculated power at a speed of 750 revolutions per minute, and the second the power at 1,000 revolutions per minute. The figures for the higher speed are printed in italic type.

The powers given in the tables represent the calculated indicated power given by one cylinder, and when multi-cylinder engines are being considered, the power shown by the table must be multiplied by the number of cylinders to give the total power.

To determine the useful power or brake horsepower, the mechanical efficiency of the engine has to be considered. No general rule can be given for this, and it may vary from a little less than 80 per cent. of the indicated power to as much as 88 per cent. For the majority of four-cylinder engines of good design and in good condition, run at speeds not unsuited to their design, and for powers of not less than 20 b.h.p., the efficiency may be considered to be 85 per cent. within reasonably close limits of accuracy This figure is, however, merely suggestive, and it is necessary to be familiar with engine design and performances to correctly estimate the brake horsepower from the estimated indicated power of these small high-speed engines.

Very frequently an approximation to the calculated indicated power, or power developed in the cylinders, is all that is required to be known, and this may be taken direct from the tables, for the two named speeds: *i.e.*, 750 or 1,000 revolutions per minute. For other speeds the difference may be taken as arithmetically proportionate through a limited range according to the type and design of the engine.

(Tables on page 382.)

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"PAN-O-LITE" Oil will quickly eliminate engine knocks and smutty plugs. It is adapted to every make of air and water-cooled cars except the "Packard," and will give perfect satisfaction where other oils fail. For "Packard" cars we make our special "EXCELSIOR" pale light gas engine cylinder oil, and will be found without equal where a light oil is desired.

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Horsepower Table I.—Cylinder Dimensions in Inches and Fractions.

Bore	0	¼	½	¾	1	¼	½	¾	2
2	0.54	0.60	0.67	0.74	0.81	0.88	0.94	1.01	1.08
	0.72	*0.80*	*0.86*	*0.98*	*1.0[illegible]*	*1.17*	*1.25*	*1.35*	*1.44*
2¼	0.76	0.84	0.92	1.01	1.0[illegible]	1.18	1.26	1.35	1.43
	1.01	*1.12*	*1.22*	*1.34*	*1.4[illegible]*	*1.57*	*1.68*	*1.81*	*1.90*
2½	1.04	1.15	1.25	1.35	1.4[illegible]	1.56	1.67	1.77	1.88
	1.39	*1.53*	*1.67*	*1.81*	*1.95*	*2.09*	*2.23*	*2.37*	*2.51*
2¾	1.39	1.51	1.64	1.77	1.89	2.02	2.14	2.27	2.40
	1.85	*2.02*	*2.19*	*2.36*	*2.5[illegible]*	*2.70*	*2.87*	*3.04*	*3.20*
3	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	3.00
	2.40	*2.60*	*2.80*	*3.00*	*3.21*	*3.40*	*3.61*	*3.81*	*4.00*
3¼	2.30	2.47	2.65	2.82	3.00	3.18	3.36	3.53	3.70
	3.06	*3.28*	*3.52*	*3.76*	*3.9[illegible]*	*4.22*	*4.45*	*4.70*	*4.92*
3½	2.86	3.06	3.27	3.48	3.68	3.88	4.09	4.30	4.50
	3.81	*4.00*	*4.36*	*4.63*	*4.9[illegible]*	*5.18*	*5.45*	*5.72*	*6.00*
3¾	3.53	3.76	4.00	4.35	4.47	4.71	4.95	5.18	5.41
	4.71	*5.02*	*5.34*	*5.65*	*5.97*	*6.28*	*6.60*	*6.91*	*7.23*
4	4.27	4.65	4.81	5.08	5.35	5.61	5.89	6.15	6.41
	5.71	*6.00*	*6.42*	*6.78*	*7.1[illegible]*	*7.50*	*7.85*	*8.20*	*8.55*
4¼	5.13	5.44	5.74	6.04	6.34	6.64	6.95	7.25	7.55
	6.84	*7.24*	*7.64*	*8.05*	*8.45*	*8.85*	*9.25*	*9.66*	*10.00*
4½	6.19	6.53	6.87	7.22	7.56	7.90	8.25	8.59	8.93
	8.25	*8.68*	*9.16*	*9.62*	*10.08*	*10.54*	*10.96*	*11.41*	*11.80*
4¾	7.18	7.55	7.94	8.31	8.70	9.07	9.45	9.82	.....
	9.57	*10.07*	*10.57*	*11.09*	*11.58*	*12.08*	*12.59*	*13.09*	.....
5	8.38	8.80	9.22	9.65	10.05	10.46	10.90	.....	.....
	11.16	*11.72*	*12.28*	*12.84*	*13.40*	*13.95*	*14.50*	.....	.....
5¼	9.70	10.16	10.62	11.09	11.54	12.00	.....	.....	.....
	12.92	*13.54*	*14.15*	*14.76*	*15.40*	*16.00*	.....	.....	.....
5½	11.12	11.65	12.15	12.66	13.15	.....	.....	.....	.....
	14.84	*15.51*	*16.20*	*16.86*	*17.54*	.....	.....	.....	.....
5¾	12.71	13.27	13.82	14.38	.....	.....	.....	.....	.....
	16.96	*17.70*	*18.42*	*19.10*	.....	.....	.....	.....	.....
6	14.45	15.05	15.65	.....	.....	.....	.....	.....	.....
	19.25	*20.05*	*20.85*	.....	.....	.....	.....	.....	.....

Horsepower Table II.—Cylinder Dimensi[illegible] in Millimeters (Metric System).

Bore	0	5	10	15	20	25	30	35	[illegible]
70	1.40	1.50	1.59	1.69	1.80	1.89	1.99	2.10	2
	1.87	*2.00*	*2.13*	*2.26*	*2.40*	*2.53*	*2.66*	*2.80*	2
75	1.72	1.84	1.95	2.07	2.18	2.29	2.41	2.53	2
	2.30	*2.45*	*2.60*	*2.76*	*2.91*	*3.06*	*3.22*	*3.37*	3
80	2.09	2.23	2.35	2.49	2.62	2.76	2.88	3.02	3
	2.79	*2.97*	*3.14*	*3.32*	*3.49*	*3.67*	*3.84*	*4.02*	4
85	2.43	2.65	2.80	2.95	3.09	3.24	3.39	3.54	3
	3.34	*3.54*	*3.73*	*3.93*	*4.12*	*4.32*	*4.52*	*4.72*	4
90	2.97	3.14	3.30	3.46	3.64	3.80	3.96	4.13	4
	3.96	*4.18*	*4.40*	*4.62*	*4.85*	*5.06*	*5.28*	*5.50*	5
95	3.50	3.68	3.87	4.05	4.24	4.42	4.61	4.80	4
	4.67	*4.91*	*5.16*	*5.40*	*5.65*	*5.90*	*6.15*	*6.40*	6
100	4.09	4.29	4.49	4.70	4.90	5.11	5.30	5.51	5
	5.45	*5.71*	*5.99*	*6.26*	*6.53*	*6.81*	*7.07*	*7.35*	7
105	4.73	4.95	5.17	5.40	5.63	5.85	6.08	6.30	6
	6.30	*6.60*	*6.90*	*7.20*	*7.50*	*7.80*	*8.10*	*8.40*	8
110	5.43	5.69	5.93	6.19	6.44	6.68	6.96	7.16	7
	7.23	*7.58*	*7.90*	*8.25*	*8.57*	*8.90*	*9.23*	*9.55*	9
115	6.22	6.48	6.77	7.03	7.30	7.56	7.85	8.11	8.3
	8.30	*8.65*	*9.02*	*9.38*	*9.74*	*10.01*	*10.46*	*10.81*	11.1
120	7.07	7.37	7.66	7.96	8.25	8.53	8.84	9.13	9.4
	9.42	*9.82*	*10.21*	*10.61*	*11.00*	*11.39*	*11.79*	*12.18*	12.5
125	7.97	8.30	8.63	8.94	9.25	9.57	9.89	10.21	10.5
	10.64	*11.06*	*11.50*	*11.91*	*12.34*	*12.76*	*13.20*	*13.61*	14.0
130	8.95	9.30	9.65	9.99	10.34	10.70	11.01	11.38	.....
	11.94	*12.40*	*12.86*	*13.31*	*13.79*	*14.25*	*14.70*	*15.16*	.....
135	10.08	10.44	10.80	11.18	11.56	11.92	12.30	.....	.....
	13.41	*13.91*	*14.40*	*14.90*	*15.41*	*15.90*	*16.40*	.....	.....
140	11.22	11.65	12.02	12.44	12.84	13.25	.....	.....	.....
	14.99	*15.51*	*16.05*	*16.60*	*17.12*	*17.68*	.....	.....	.....
145	12.52	12.98	13.41	13.82	14.25	.....	.....	.....	.....
	16.70	*17.30*	*17.88*	*18.42*	*19.00*	.....	.....	.....	.....
150	13.81	14.26	14.72	15.40	.....	.....	.....	.....	.....
	18.41	*19.01*	*19.64*	*20.23*	.....	.....	.....	.....	.....

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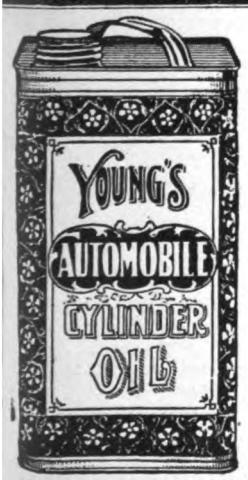

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HORSEPOWER OF INTERNAL COMBUSTION MOTORS

H. H. BROWN

Owing to the great number of factors which influence the power delivered by high speed internal combustion engines the only sure way of determining this is by a brake test. Nevertheless, for purposes of easy comparison or for a basis for handicapping various authorities and associations have compiled various formulas from which the approximate D. H. P. can be calculated when certain data are known. In some cases a certain piston speed is assumed, while in others a certain r. p. m. is assumed. In these cases only the diameter and the stroke of the piston need be known.

In some of these formulas as originally compiled the area of the bore was taken as one of the factors, in others the stroke was expressed in feet or decimal fractions thereof. For the sake of uniformity and to save work the formulas are altered so that the square of the bore is used and the stroke is expressed in inches.

In one formula as originally compiled (that of the Royal Automobile Club), the dimensions were to be expressed in millimeters. The formulas have been altered so that it can be worked in inches.

The formula then becomes:

$$\frac{D^2 \times L \times n \times R}{C} = \text{Rated or delivered H. P.}$$

TABLES OF HORSEPOWER FORMULAS

Four-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. For gas.	$D^2 \times L \times R \times n$	19000
Roberts. For gasoline.	$D^2 \times L \times n \times R$	18000
Royal Automobile Club.	$(D + L)^2 \times n$	$\frac{6500}{25.6^2} = 9.92$
A. L. A. M.	$D^2 \times n$	2.5

This formula is on a basis of 1000-ft. piston speed.

American Power Boat Association.*	$D^2 \times n$	$\frac{2.000}{0.7854} = 2.5338$
A. P. B. A.* for motors of less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{1.000 \times 12}{.7854} = 15.20$

*The two formulas given above are for motors of boats rated as automobile boats. For others the rating should be taken as two-thirds of that given by these formulas. In case some device is used to force the charge into the cylinder 10 per cent. should be added to the ratings.

If an expansion or lower pressure cylinder is used 20 per cent. of the square of the diameter of this cylinder or cylinders shall be added to the $D^2 \times n$ and divided by the regular constant.

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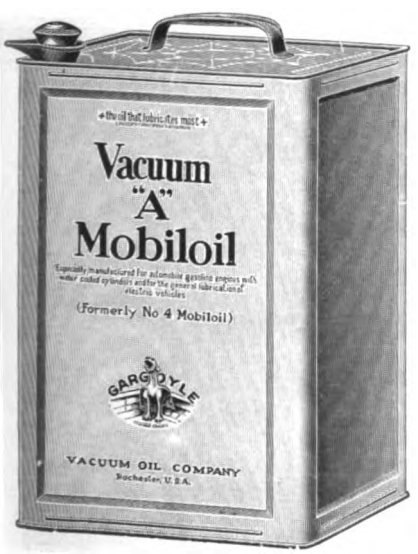
Columbus, Ohio

Vacuum Mobiloils



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Two-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. Gas.	$D^2 \times L \times R \times n$	14000
Roberts. Gasoline.	$D^2 \times L \times R \times n$	13500
American Power Boat Association.*	$D^2 \times n$	$\frac{1.65}{.7854} = 2.1008$
Same for less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{12 \times .85}{\times .7854} = 12.987$

*The above are for automobile racing boat engines; for others the rating is taken as two-thirds of the above formulas. For engines having a displacer cylinder or cylinders the above rating is increased in the ratio that the displacer piston's displacement bears to that of the working cylinders.

INDICATED HORSEPOWER

On account of the great difficulty of securing good indicator cards at the high-piston and rotative speeds of automobile motors this is very little employed. The manograph which is employed for obtaining cards or diagrams from high-speed motors, as a general thing does not have an equal pressure scale and therefore does not readily lend itself to the accurate determination of I. H. P.

The indicated H. P. may of course be determined approximately by assuming a certain mechanical efficiency for the motor under consideration. This varies from as high as 90 per cent. in some cases to lower than 70 per cent. in others; the average would probably be not far from 80 per cent.

The formula for I. H. P., the bore and stroke being known as well as the R. P. M. and the mean effective pressure, is,

$$\frac{D^2 \times L \times R.P.M. \times n \times M.E.P.}{\frac{33{,}000. \times 12 \times 2}{.7854}} = I.H.P. \text{ (for 4-cycle).}$$

This constant equals 550,000 and the formula becomes $\frac{D^2 \times L \times n \times M.E.P. \times R.}{550{,}000.}$

The constant for 2-cycle is 275,000.

A formula which is given by Grover for the mean effective pressure, the compression being known, is as follows:

$$M.E.P. = 2C - 0.01\,C^2$$

C = Compression pressure above atmosphere in pounds per square inch.

This formula does not hold good for compression pressures over 100 pounds per square inch above atmosphere. Comparatively recent data seems to prove the reliability of this formula, also the fact, which Grover points out, that under favorable conditions, the values given by this formula may be slightly exceeded. Tests with higher pressures than 100 pounds show that the M. E. P. tends to remain at 100 pounds per square inch.

The compression pressure may be obtained by some form of gauge, the ignition for that cylinder being cut off, or in case the volume of the explosion chamber is known it may be obtained from the formula.

$PV^{1.3}$ = Constant. P being the absolute pressure.

V being taken in the one case as the volume of the combustion chamber and in the other as the above plus the piston displacement. P being in one case atmospheric pressure and in the other the absolute compression pressure. Of course for C in Grover's formula the assumed atmospheric pressure should be subtracted from the result obtained by this formula.

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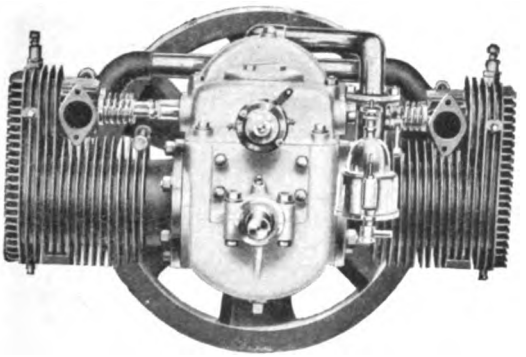
1909

MODEL "K" MOTOR

FOR HIGH WHEEL BUGGY TYPE and LIGHT DELIVERY WAGON

14 H. P. Air Cooled 16 H. P. Water Cooled



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MECHANICALLY OPERATED VALVES

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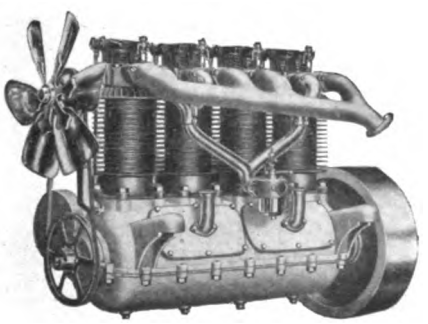

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APPROXIMATE HORSEPOWER OF FOUR-CYCLE AUTOMOBILE ENGINES

Table of Constants for Variable Speeds and Strokes

Stroke in Ins.	Revolutions per Minute of Motor														
	500	550	600	650	700	750	800	850	900	950	1,000	1,050	1,100	1,150	1,20
2.00.....	0.89	.098	.107	.116	.124	.134	.142	.153	.161	.169	.178	.187	.196	.205	21
2.25.....	.100	.110	.120	.130	.140	.151	.160	.171	.181	.190	.200	.210	.220	.231	24
2.50.....	.112	.125	.133	.145	.156	.167	.176	.189	.201	.212	.223	.233	.245	.257	.26
2.75.....	.123	.135	.146	.159	.172	.184	.196	.208	.221	.233	.245	.256	270	.282	.29
3.00.....	.134	.147	.160	.174	.187	.201	.214	.227	.241	.254	.267	.279	.294	.308	.32
3.25.....	.145	.158	.173	.188	.203	.219	.232	.246	261	.275	.289	.303	.319	.333	.34
3.50.....	.156	.173	.186	.203	.218	.234	.250	.265	.281	.296	.312	.326	.343	.359	.37
3.75.....	.167	.184	.200	.218	.234	.252	.266	.284	.301	.317	.334	.349	.368	.385	.40
4.00.....	.178	.196	.214	.232	.249	.268	.285	.303	.321	.339	.356	.373	.392	411	.42
4.25.....	.189	.208	.227	.246	.264	.285	.303	.322	.341	.360	.378	.396	.416	.436	.45
4.50.....	.200	.220	.240	.261	.280	.305	.321	.341	.361	.381	.400	.419	.441	.461	.48
4.75.....	.212	.233	.253	.275	.295	.319	.339	.360	.381	.402	.423	.443	.466	.486	.50
5.00.....	.223	.245	.266	.290	.312	.335	.357	.379	.401	.423	.445	.466	.491	.512	.53
5.25.....	.234	.257	.279	.304	.327	.351	.375	.398	.421	.444	.467	.490	.515	.538	.56
5.50.....	.245	.270	293	.318	.343	.368	.393	.417	.441	465	.489	.513	.540	.564	.59
5.75.....	.258	.282	.307	.332	.369	.385	.410	.436	461	486	.512	.536	.564	.589	.61
6 00.....	.268	.294	.320	.348	.375	.402	.428	.455	.481	.508	535	.559	.589	.615	.64

Bore in Ins.	Square of Bore
2.00	4.00
2.25	5.06
2.50	6.25
2.75	7.55
3.00	9.00
3.25	10.56
3.50	12.25
3.75	14.05
4.00	16.00
4.25	18.05
4.50	20.20
4.75	22.55
5.00	25.00
5.25	27.50
5.50	30.20
5.75	33.05
6.00	36.00

Rule:—Multiply number to right of bore by number in upper table at intersection of proper R.P.M. and stroke columns.

Example:—Find approximate horsepower developed by motor having 4.25″ bore and 5″ stroke at 800 revolutions per minute.

Under 4.25 bore we find 18.05.

At intersection of 5″ stroke line and 800 R.P.M. column in upper table we find .357.

The product of these numbers gives the horsepower, thus:

Approximate horsepower = 18.05 × .357 = 6 45 H.P.

These figures have been computed for the average M.E.P. as found in the ordinary motor car engine, but of course will vary with increase or decrease in compression and with different mechanical efficiencies.

*For multi-cylinder engines, multiply by number of cylinders. Above formula gives H.P. for only one cylinder.

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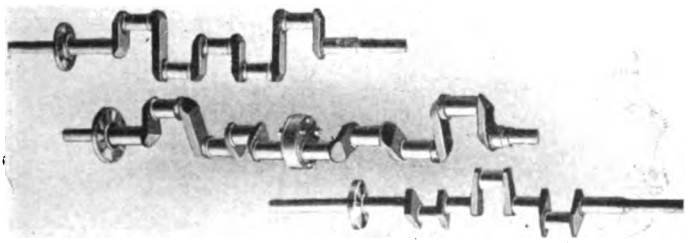

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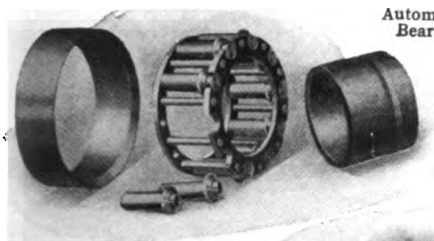

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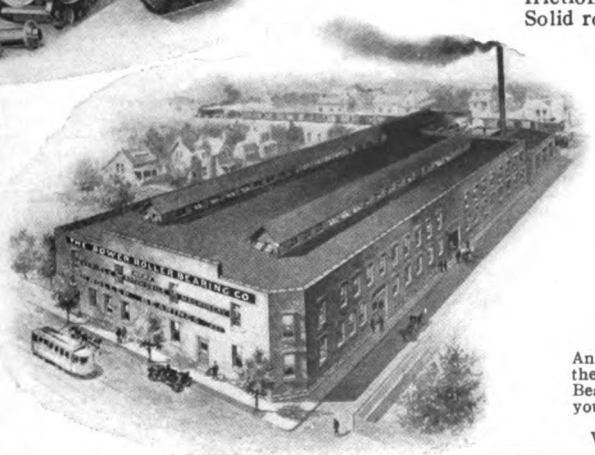

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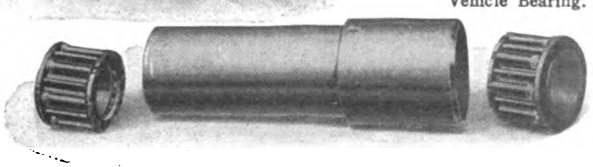

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A. L. A. M. STANDARD HORSE POWER FORMULA.

(Bore of Cylinder Squared x No. of Cylinders, ÷ 2.5)

Bore		Horse Power			
Inches	Mill.	1 Cyl.	2 Cyl.	4 Cyl.	6 Cyl.
2 1/2	64	2 1/2	5	10	15
2 5/8	68	2 3/4	5 1/2	11	16 1/2
2 3/4	70	3	6	12 1/10	18 1/5
2 7/8	73	3 5/16	6 5/8	13 1/4	19 7/8
3	76	3 3/5	7 1/5	14 2/5	21 3/5
3 1/8	79	3 15/16	7 13/16	15 5/8	23 7/16
3 1/4	83	4 1/4	8 1/2	16 9/10	25 2/5
3 3/8	85	4 9/16	9 1/8	18 1/4	27 2/5
3 1/2	89	4 9/10	9 4/5	19 3/5	29 2/5
3 5/8	92	5 1/4	10 1/2	20 1/4	31 3/5
3 3/4	95	5 5/8	11 1/4	22 1/2	33 3/4
3 7/8	99	6	12	24	36 1/16
4	102	6 2/5	12 4/5	25 3/5	38 2/5
4 1/8	105	6 13/16	13 5/8	27 1/4	40 9/10
4 1/4	108	7 1/4	14 1/2	28 9/10	43 4/5
4 3/8	111	7 5/8	15 5/16	30 5/8	45 15/16
4 1/2	114	8 1/10	16 1/5	32 2/5	48 3/5
4 5/8	118	8 9/16	17 1/8	34 1/4	51 3/5
4 3/4	121	9	18	36 1/10	54 1/10
4 7/8	124	9 1/2	19	38	57
5	127	10	20	40	60
5 1/8	130	10 1/2	21	42	63
5 1/4	133	11	22	44 1/10	66 1/5
5 3/8	137	11 9/16	23	46	69 1/10
5 1/2	140	12 1/10	24 1/5	48 2/5	72 3/5
5 5/8	143	12 5/8	25 5/16	50 5/8	75 15/16
5 3/4	146	13 1/4	26 1/2	53	79 1/2
5 7/8	149	13 13/16	27 5/8	55 1/4	82 9/10
6	152	14 2/5	28 4/5	57 3/5	86 2/5

Computed at 1,000 feet per minute piston speed.

BALANCE SHEET REPORTED BY COMMITTEE OF BRITISH INSTITUTION OF CIVIL ENGINEERS ON STANDARDS OF EFFICIENCY OF INTERNAL COMBUSTION ENGINES

Tests were made on three engines of 5 ins., 9 ins. and 14 ins. diameter cylinders, respectively, giving 6 I.H.P., 24 I.H.P. and 60 I.H.P.

	6 I.H.P.	24 I.H.P.	60 I.H.P.
Exhaust waste	35.3	40.0	39.5
Jacket waste	23.5	29.3	25.0
Radation	7.6	10.0	7.3
B.H.P.	26.7	28.3	29.8
	93.1	107.0	101.0

In obtaining this balance sheet the exhaust waste was determined by calorimeter, jacket waste measured, and the radiation includes friction of the working parts. The brake horse power was determined by rope brake. Mechanical efficiencies for the three engines may be assumed as 0.84, 0.85 and 0.86 respectively

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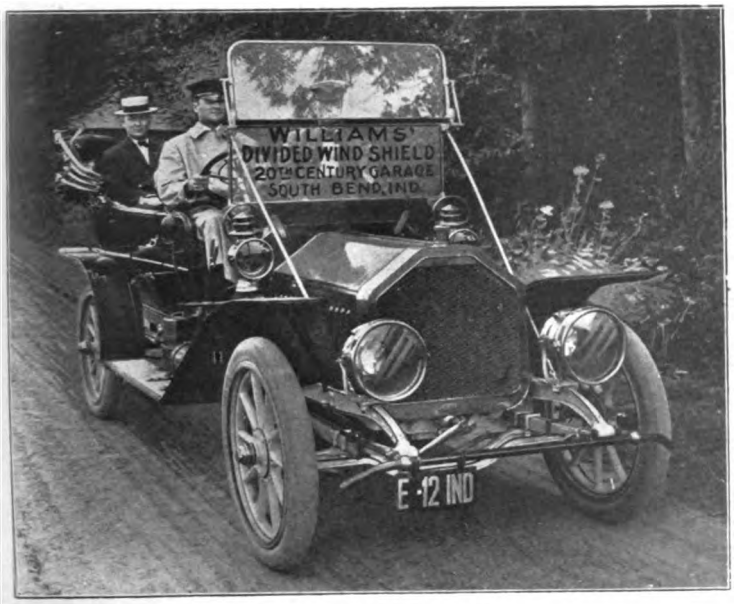
WILLIAMS' DIVIDED WIND SHIELD



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Frame Solid Brass, Heavy Plate Glass, size 30 x 42, folding in or out; and Brass Extension Bars which hold it absolutely rigid. Price, Shield Complete, **$60.** With Mahogany Filler, fitted to dash, **$65.**

WE ALSO MANUFACTURE Tire Holders, Robe Rails, Foot Rests, Lamp Brackets, Motor Boat Accessories, Full Line of Metal Auto Trimmings, ALL GRADES OF CASTINGS in Brass, Bronze, Aluminum or White Metal and all non-ferrous metals of all descriptions at SPECIALLY ATTRACTIVE PRICES. Write to us.

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TABLE OF CRANK ANGLES AND CORRESPONDING PISTON POSITION

Out denotes the stroke towards the crankshaft.
In denotes the stroke away from the crankshaft.

Crank Angles in Degrees	Connecting Rod to Crank Ratio = 4		Connecting Rod to Crank Ratio = 4.5		Connecting Rod to Crank Ratio = 5	
	Out	In	Out	In	Out	In
2	.0004	.0002	.0004	.0003	.0004	.0003
4	.0015	.0010	.0015	.0010	.0015	.0010
6	.0034	.0021	.0033	.0021	.0033	.0022
8	.0061	.0036	.0060	.0038	.0058	.0039
10	.0095	.0057	.0092	.0059	.0091	.0061
12	.0136	.0082	.0133	.0087	.0131	.0088
14	.0185	.0112	.0181	.0116	.0178	.0119
16	.0241	.0146	.0236	.0152	.0232	.0156
18	.0304	.0185	.0298	.0192	.0293	.0197
20	.0375	.0228	.0367	.0237	.0360	.0243
22	.0452	.0276	.0442	.0286	.0434	.0294
24	.0536	.0329	.0524	.0340	.0515	.0349
26	.0627	.0385	.0613	.0399	.0602	.0410
28	.0724	.0447	.0708	.0462	.0696	.0475
30	.0827	.0513	.0809	.0531	.0796	.0545
32	.0936	.0583	.0916	.0603	.0901	.0619
34	.1051	.0658	.1029	.0680	.1012	.0698
36	.1172	.0738	.1147	.0762	.1128	.0782
38	.1298	.0822	.1271	.0848	.1250	.0870
40	.1430	.6910	.1400	.0939	.1377	.0962
42	.1565	.1002	.1534	.1034	.1509	.1059
44	.1707	.1099	.1673	.1134	.1646	.1161
46	.1853	.1201	.1816	.1237	.1787	.1267
48	.2003	.1306	.1963	.1345	.1392	.1377
50	.2156	.1416	.2115	.1458	.2081	.1491
52	.2314	.1530	.2270	.1574	.2234	.1609
54	.2474	.1648	.2428	.1695	.2391	.1732
56	.2638	.1769	.2589	.1819	.2550	.1858
58	.2805	.1896	.2754	.1947	.2713	.1988
60	.2974	.2026	.2920	.2079	.2878	.2122
62	.3146	.2159	.3090	.2215	.3046	.2260
64	.3320	.2297	.3262	.2355	.3215	.2401
66	.3495	.2438	.3435	.2498	.3387	.2545
68	.3672	.2582	.3610	.2644	.3561	.2693
70	.3850	.2730	.3786	.2794	.3735	.2844
72	.4028	.2881	.3963	.2947	.3911	.2998
74	.4208	.3036	.4141	.3103	.4088	.3155
76	.4388	.3193	.4319	.3261	.4266	.3315
78	.4568	.3353	.4498	.3422	.4444	.3477
80	.4747	.3516	.4677	.3586	.4622	.3642
82	.4927	.3682	.4857	.3753	.4799	.3809
84	.5105	.3849	.5034	.3921	.4977	.3978
86	.5283	.4019	.5211	.4091	.5154	.4149
88	.5460	.4191	.5388	.4263	.5330	.4321
90	.5635	.4365	.5563	.4437	.5505	.4495
92	.5802	.4540	.5737	.4612	.5670	.4670
94	.5981	.4787	.5909	.4789	.5851	.4846
96	.6151	.4895	.6079	.4966	.6022	.5028
98	.6318	.5073	.6247	.5143	.6191	.5201
100	.6484	.5253	.6414	.5323	.6358	.5378
102	.6647	.5432	.6578	.5502	.6523	.5556
104	.6807	.5612	.6739	.5681	.6685	.5734
106	.6964	.5792	.6897	.5859	.6845	.5912
108	.7119	.5972	.7053	.6037	.7002	.6082
110	.7270	.6150	.7206	.6214	.7156	.6265
112	.7418	.6328	.7356	.6390	.7307	.6439
114	.7562	.6505	.7502	.6565	.7455	.6613

(Continued on page 394)

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Crank Angles in Degrees	Connecting Rod to Crank Ratio=4		Connecting Rod to Crank Ratio=4.5		Connecting Rod to Crank Ratio=5	
	Out	In	Out	In	Out	In
116	.7703	.6680	.7645	.6738	.7599	.6785
118	.7841	.6854	.7785	.6910	.7740	.6954
120	.7974	.7026	.7921	.7080	.7878	.7122
122	.8104	.7195	.8053	.7246	.8012	.7287
124	.8230	.7362	.8181	.7411	.8142	.7450
126	.8352	.7526	.8305	.7572	.8268	.7609
128	.8470	.7686	.8426	.7730	.8391	.7766
130	.8584	.7844	.8542	.7885	.8509	.7919
132	.8694	.7997	.8555	.8037	.8623	.8068
134	.8799	.8147	.8763	.8184	.8733	.8213
136	.8901	.8293	.8866	.8327	.8839	.8354
138	.8998	.8434	.8965	.8466	.8941	.8491
140	.9090	.8570	.9061	.8500.	.9038	.8623
142	.9178	.8702	.9152	.8729	.9130	.8750
144	.9262	.8828	9238	.8853	.9218	.8872
146	.9342	.8949	.9320	.8971	.9302	.8988
148	.9417	.9064	.9397	.9084	.9381	.9099
150	.9487	.9173	.9469	.9191	.9455	9204
152	.9553	.9276	.9538	.9292	.9525	.9304
154	.9617	.9373	.9601	.9387	.9590	.9398
156	.9671	.9464	.9660	.9476	.9651	9485
158	.9724	.9548	.9714	.9558	.9706	.9566
160	.9772	.9625	.9763	.9633	.9757	.9640
162	.9815	.9696	.9806	.9702	.9803	9707
164	.9854	.9759	.9848	.9764	.9844	.9767
166	.9888	.9815	.9884	.9819	.9881	.9822
168	.9918	.9864	.9913	.9867	.9912	9869
170	.9943	.9905	.9941	9908	.9939	.9909
172	.9963	.9939	.9962	.9940	.9961	9942
174	.9979	.9966	.9979	.9967	9978	.9967
176	.9990	.9985	.9990	.9985	.9990	.9985
178	.9998	.9996	.9997	.9996	.9097	.9996
180	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

This table should be useful for engine timing and for port design in two-cycle engine The quantities are expressed in fractions of the stroke.

EFFECT OF HEAT ON TENSILE STRENGTH AND EXPANSION OF PURE ALUMINUM

Shrinkage of Aluminum Castings

Temperature Fahrenheit	Tensile Strength Tons per Square Inch	Expansion in Volume
58°	11.7	.000884
212°	9.5	.006120
302°	8.1	.009180
392°	6.3	.012240
482°	4.8	.015300
572°	3.6	.018360
752°	2.2	.024480
842°	1.5	.027540
860°	1.0	.028152

Shrinkage in aluminum castings is about 17-64th inch per foot.

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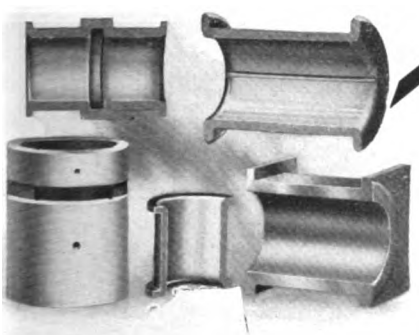

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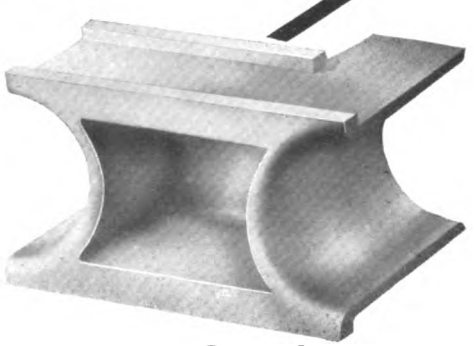

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DIMENSIONS AND LIFT OF POPPET VALVES FOR A GIVEN SIZE OF OPENING

D = Smaller diameter of valve seat.
d = diameter of piping to which valve opening must correspond.

$$r = \frac{D}{d}$$

FLAT-SEATED VALVES.

For $r = 1$	Lift	$= d \times 0.250 = D \times 0.250.$
" $r = 1.25$	"	$= d \times 0.200 = D \times 0.160.$
" $r = 1.5$	"	$= d \times 0.166 = D \times 0.111.$
" $r = 2$	"	$= d \times 0.125 = D \times 0.162.$
" $r = 2.5$	"	$= d \times 0.100 = D \times 0.040.$

CONE-SEATED VALVES; 45° ANGLE OF CONE.

For $r = 1$	Lift	$= d \times 0.307 = D \times 0.307.$
" $r = 1.25$	"	$= d \times 0.256 = D \times 0.205.$
" $r = 1.5$	"	$= d \times 0.219 = D \times 0.146.$
" $r = 2$	"	$= d \times 0.170 = D \times 0.084.$
" $r = 2.5$	"	$= d \times 0.138 = D \times 0.055.$

It will be noted that cone-seated valves require a lift from one-fifth to one-quarter greater than the corresponding flat-seated valves.

The proportions of lift given in connection with flat-seated valves are geometrically correct. It should, however, be borne in mind that flat-seated valves generally introduce a certain amount of wire drawing of the incoming charge. A slight increase over the theoretically correct lifts should consequently be provided. A definite coefficient cannot be given, as this will depend considerably upon the valve seat and valve chest design as well as upon the proportions of the fillet between valve stem and valve head. The matter is one of personal intuition by the designer; in the best French designs the extra allowance seldom exceeds 25 per cent. of the theoretical lift. It is well to so arrange the contour of the valve and valve chamber profiles that a minimum of lift be required, as this is favorable to silence in running and to flexibility.

ALLOWANCES FOR FITS IN AUTOMOBILE CONSTRUCTION

Fits in automobile construction can be divided into,

FORCE FITS.

To be used in parts where disassembling will hardly be required, and which are assembled by means of hydraulic or screw presses, or when hot.

DRIVING FITS.

To be used in parts where close adherence is required, but which must be as embled and disassembled with no other help than an ordinary hammer; such as flywheels, gear wheels, ball-bearing inner races, etc.

PUSH FITS.

To be used in parts without relative motion in actual work but which must have sufficient freedom to be assembled by hand; such as bolts, slip joints, ball-bearing outer races, etc.

RUNNING FITS.

To be used in parts possessed of relative motion in normal running; these can be subdivided into,

Easy Fits; where great freedom of running is required with possibility of scant lubrication, such as valve guides, control connections, clutch shafts, etc.

Close Fits ; to be used in all high-speed work and especially the engine and transmission.

Fine Fits ; to be used in parts where great accuracy is required or where, while the motion is slight the stresses are of an alternating or vibratory nature, such as connecting rod small ends, steering connections etc.; efficient lubrication must be provided if the motion is frequently recurring.

(Continued on page 398)

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They tell the truth at any speed up to their limit.

No jar or jolt of the car will shake the hand.

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Ball bearings throughout.

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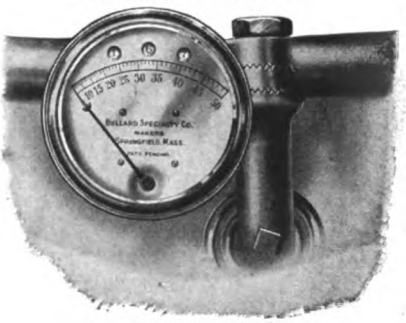

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We have no shaft troubles, owing to its slow motion and ease of running.

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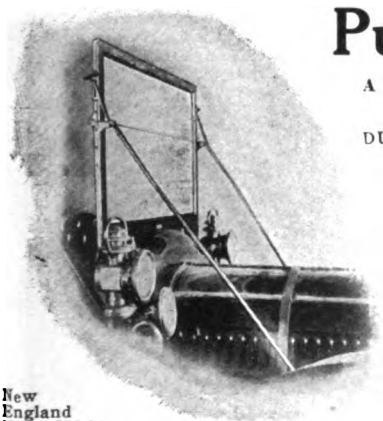

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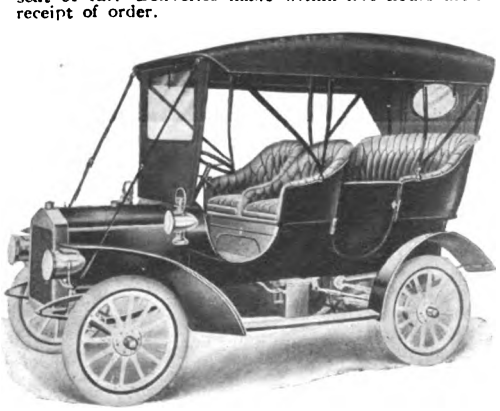
Frame—Mahogany or Ebony finish, edges bound with ⅛ oval Brass.

Metal Parts—Highly polished Solid Brass, carefully machined.

Glass—Selected ¼-in. Polished Plate.

Adjustable to any style dash. Easily operated from seat of car. Deliveries made within five hours after receipt of order.



When ordering or inquiring, give model of car, and measurement between top of dash and front bow of Auto Top.

This Shield carries a full Guarantee in every respect.

Write for full particulars and prices. Manufactured by

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Auto Tops Slip Covers Wind Shields

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Fit Allowances

In the allowances given in the following the expansion of metals when of different nature or exposed to heat in a different degree, such as is the case in some parts of engine construction, has not been taken into account.

Allowance Over Nominal Diameter for Force Fits

Nominal diameter	½"	1"	2"	3"
Maximum "	0.50100	1.00200	2.00400	3.00600
Minimum "	0.50050	1.00150	2.00300	3.00450

Allowance Over Nominal Diameter for Driving Fits

Nominal diameter	½"	1"	2"	3"
Maximum "	0.50050	1.00100	1.00125	1.00250
Minimum "	0.50025	1.00075	1.00100	1.00150

Allowance Below Nominal Diameter for Push Fits

Nominal diameter	½"	1"	2"	3"
Maximum "	0.49975	0.99950	1.99900	2.99850
Minimum "	0.49925	0.99900	1.99850	2.99800

Allowance Below Nominal Diameter for Running Fits

EASY FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.49900	0.99875	1.99825	2.99800
Minimum "	0.49800	0.99725	1.99650	2.99575

CLOSE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.59925	0.99900	1.99875	2.99850
Minimum "	0.59875	0.99800	1.99750	2.99700

FINE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.59950	0.99925	1.99925	2.99900
Minimum "	0.59925	0.99875	1.99850	2.99800

For intermediate dimensions comparison between the size immediately below and that immediately above will give the safe allowances in each case.

COMBUSTION CONSTANTS OF VARIOUS GASES AND FUELS

	Atomic Weight Hydrogen=1	Molecular Weight H_2 2	Specific Gravity at 32° F. and Atmospheric Pressure Water=1	Density in Pounds per Cubic Foot	Specific Heat at Constant Pressure	Specific Heat at Constant Volume	Coefficient of Expansion of Volume at Constant Pressure per Deg. Centigrade	Coefficient of Expansion of Volume at Constant Pressure per Deg. Fahrenheit	British Thermal Units Given Out During Combustion with Oxygen
Air			.00130	.0809	.2377	.1690	.003665	.002036	
Carbon	11.97		2.33		.2411				14,540
Carbonic acid gas		CO^2 43.89	.00198	.1225	.2164	.1535	.003683	.002049	
Carbonic oxide		CO 27.93	.00126	.0784	.2479	.1758	.003667	.002037	4,370
Coal gas (average)			.00054	.0335					17,800
Hydrogen	1	H_2 – 2	.00009	.0056	3.4046	2.414	.003667	.002037	61,200
Methane		CH_4 15.97	.00072	.0448	.5929	.4701			26,400
Oxygen	15.96	O_2 31.92	.00144	.0896	.2182	.156			
Steam at 212° F.		H_2O 17.96	.0008	.05	.4750	.34			
Refined petroleum			.8						22,000
Crude petroleum			.9						20,000

Specific heat of gas engine exhaust gases = .258 at constant pressure and .189 at constant volume

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Manufacturers of

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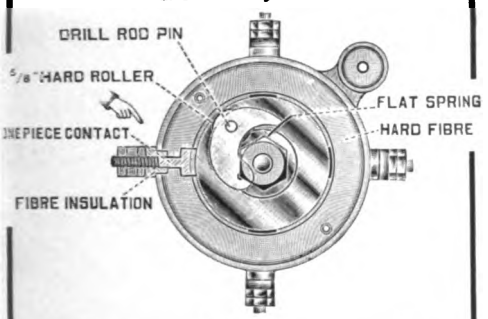


2-Cyl. Brass incased	- -	**$3.50**
4-Cyl. Brass incased	- -	**4.00**
2-Cyl. Fibre exposed	- -	**3.00**
4-Cyl. Fibre exposed	- -	**3.50**

Discount to the trade

The only one-piece steel contact Timer on the market. Saves current. Eliminates separation of contact segments from binding screw.

High grade construction and workmanship. Hard gray fibre. Made for durability.

Details on Request.

The Best Built Plug in the World Barring None

FRY

of course

For Magneto and Battery

ABSOLUTELY INDESTRUCTIBLE

SATISFACTION OR YOUR MONEY BACK

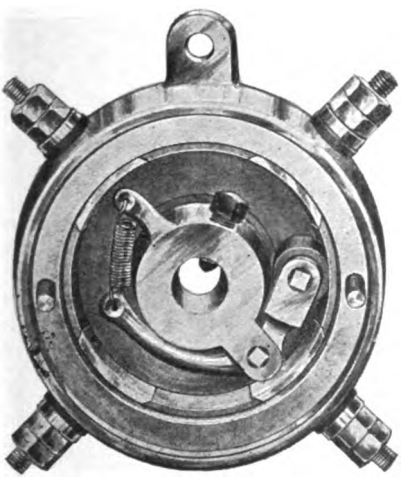
75c. EACH POST PAID

WRITE FOR DISCOUNTS

STANDARD SALES CO.

1964 Broadway, NEW YORK CITY

"DE LUXE" MODEL



Timers and Distributers

For all conditions of services, AUTOMOBILE, STATIONARY, MARINE AND AIRSHIP.

Our increased manufacturing facilities are such that we can guarantee early delivery in any quantity. (Special timers from manufacturers' specifications.)

ALTEMUS MFG. CO.

42d and Chestnut Sts. PHILADELPHIA, PA.

The Break Circuit Auto-Lock

Is a thief-proof lock switch which takes the place of your present switch. Cannot be wired around. Applicable to any ignition system. Does away with two switches where magneto is used. Is a combination of Yale Lock and circuit breaker. Keys not interchangeable.

Is emergency circuit breaker on electric car when controller fails to work.

WRITE TO-DAY.

Safety Device Co.

INDIANAPOLIS, IND.

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WORK DONE BY CLUTCH AND BRAKES

C. H. TAYLOR

Energy absorption of the clutch in accelerating a motor vehicle, assuming the ideal condition of uniform acceleration:

$$W = \frac{MV\,(2Q - FV)}{2\,(F - Mg\theta)}$$

and

$$w = Q - \frac{FV}{2}$$

$$f = \frac{MV}{F - Mg\,\theta}$$

where W = total energy absorbed by clutch in accelerating the mass M from zero to V ft. per second when coupled with a motor developing Q foot-pounds per second; w = energy per second absorbed by clutch under the above conditions $= \frac{W}{f}$, where f = time required for acceleration in seconds. θ = tangent of the grade angle, or the per cent. of grade; F = accelerative force applied by the propelling system; g = gravity = 32.2. Also.

$$W = MV\left(\frac{Q}{F} - \frac{V}{2}\right)$$

where $\theta = o$ and

$$f = \frac{MV}{F}.$$

Energy required to be absorbed by the brakes when stopping a motor vehicle, on the level, from full speed is equal to

$$E = \frac{MV^2 + Mg\theta fV}{2}$$

$$f = \frac{MV}{F - Mg\theta},$$

using the same symbols as for the clutch formula, but applied to retardation instead of acceleration.

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The Hoyt System

of Testing Ignition

keeps you constantly informed as to the actual condition of the Ignition System. If there is any trouble with the batteries, coils, vibrators, timer, spark plugs or wiring, it will inform you where it is. It will increase the efficiency of your engine and lengthen the life of your batteries and vibrators. It will tell you, at all times, the mileage there is remaining in your batteries. It is to the Ignition System what the steam gauge and water glass are to the steam boiler.

If your car is not already equipped with this System you should know about it. It is simple, yet effective. If you are interested, send for bulletin T-D describing it.

HOYT ELECTRICAL INSTRUMENT WORKS

PENACOOK, N. H.

A Non-Sulphating Storage Battery Igniter

SIZE 66

6 VOLTS, 60 AMPERE HOURS

Price, $15.00

GUARANTEE

The Geiszler Igniter is guaranteed to give more mileage than any other Storage Battery on the market of the same rated capacity, regardless of price. They are guaranteed to give perfect satisfaction or money will be refunded any time within one year from date of purchase.

SEND FOR CATALOG T.

Geiszler Brothers

514-20 West 57th Street

New York City

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TRANSMISSION EFFICIENCY OF DIFFERENT TYPES OF MECHANISM (WORBY BEAUMONT)

Source of Loss of Power	Amount of Loss Per Cent.	Efficiency Per Cent.
		100
When d iving direct:		
One chain	3.0	....
One and one-half pairs of bearings	7.5	89.5
With epicylic speed gear in operation, add	15.0	74.5
When driving direct:		
One set of gear	5.0	...
Two pairs of bearings	10.0	....
Partially active bearings	3.0	82.0
With change-speed reduction gear in operation, add	12.0	70.0
One set of gear	5.0	....
Three pairs of bearings	15.0	....
Equivalent of two chains	6.0	74.0
Two sets of gear	10.0	....
Four pairs of bearings	20.0	70 0
Two sets of gear	10.0	....
Five pairs of bearings	25.0	....
Equivalent of one chain	3.0	62.0
Equivalent of three sets of gear	15.0	....
Five pairs of bearings	25.0	60.0

TRACTION EFFORT ON VARIOUS SURFACES (NORRIS)

On rails or plates	5.16 pounds per ton
Asphalt or hardwood	12.24 " " "
Macadam	30.60 " " "
Loose gravel	140 to 200 " " "
Sand	400 " " "
With different tires (comparatively):	
Iron	60 " " "
Solid Rubber	60 " " "
Pneumatic	45 " " "

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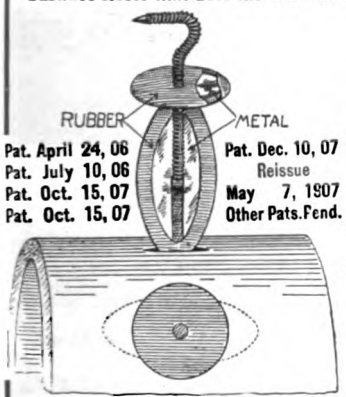
HERE'S "THE PERMANENT" PUNCTURE CLOSER

Never fails to produce Satisfactory Results

"The Permanent" Puncture Closer is a combination of metal and rubber reinforced—has been thoroughly tested on both single and donble tube tires; is quickly inserted without special tools, no delays—no danger of injury to tire—a strong, durable closer that does the work intended.



Every Motorist should carry a full supply—many motorists do. Delays avoided and money saved by their use.

Dealers: There's big money easily and quickly made handling this specialty.—Liberal Discounts. Write today for full particulars. Manufactured by

D. APSTEIN MFG. CO., Bridgeport, Conn.

**We also make a plug for single tube bicycle tires

Just when it starts to rain—that's the time to put on your

Weed Chains

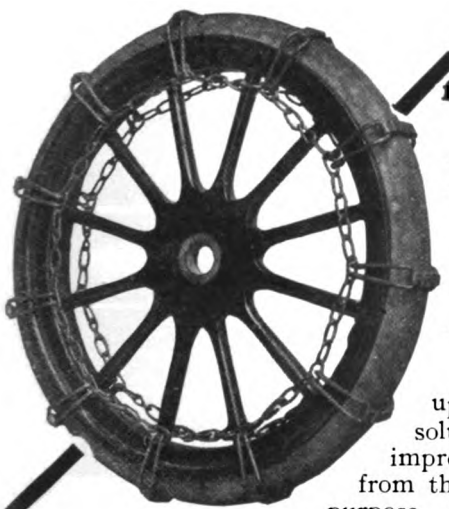
They grip and hold the road wheels in mud, sand and snow without injury to the road. They positively prevent skidding or slipping on greasy and wet pavements. They preserve tires and enable the heaviest automobile to climb hills easily.

Fit any standard tires; are readily attached and detached.

WRITE FOR BULLETIN

Weed Chain Tire Grip Co.

28 Moore Street, New York



Positive Traction for Commercial Vehicles

The PERFECTION NON-SKID CLIMBER

SIMPLE, PRACTICAL, NEAT and MOST DURABLE.

Will furnish traction on any road—up hill or down, wet or dry, and give absolute assurance the car will not skid. An improvement on all other devices. Made from the finest steel specially treated for this purpose. They cannot injure the tire because we use a perfectly smooth clip next to the tire with edges rounded, and there is no chain over the tire to collect sand and gravel to constantly cut it. "The Perfection" has 75 per cent. less wearing parts than any other device.

DEALERS

Here is something you can make money on—every commercial car must have them—simply show this device and it sells itself. We give liberal discounts and you can make good profit.

Write to-day for full particulars and special proposition.

THE PERFECTION NON-SKID CLIMBER CO., Edon, Ohio

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POWER CONSUMED IN MOVING A PLANE SURFACE AT DIFFERENT VELOCITIES IN THE OPEN AIR (KEMPE)

SPEED IN		Horse-power per Square foot of Effective Surface	SPEED IN		Horse-power per Square foot of Effective Surface
Miles per Hour	Feet per Minute		Miles per Hour	Feet per Minute	
10	880	0.013	50	4,400	1.64
15	1,320	0.044	75	6,600	5.54
20	1,760	0.105	100	8,800	13.13
25	2,200	0.205	150	13,200	44.29
30	2,640	0.354	200	17,600	105.00

STRIKING ENERGY OF AUTOMOBILES (DURAND)

Let W = weight of automobile, measured in pounds.
F = average force over the distance required to bring automobile to rest, measured in pounds.
L = distance over which force is exerted to bring automobile to rest, measured in feet.
V = velocity in feet per second,

Then Energy $= \dfrac{W V^2}{64.4}$ in foot pounds,

$F L$ = measure of destructive work done in stopping the machine.

Then $$F L = \frac{W V^2}{64.4}$$

$$F = \frac{W V^2}{64.4 L}$$

$$L = \frac{W V^2}{64.4 F}$$

Or, otherwise and more generally, let E be any fraction or amount of energy which is lost in overcoming an average resistance F over a distance L.
Then:

$$E = F L$$
$$F = E \div L$$
$$L = E \div F$$

In the actual case of automobile collision, F, as has been carefully noted, is merely a distance average of the force developed. It means simply that there will be as much destructive work done as would correspond to the exhibition of a force F over a distance L. Actually, the destructive work will be made up of parts, each one of which may consist of a very much larger force, acting through such smaller distance as may be needed for the rupture of the part in question.

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STEATITE-SPARK-PLUG
MICA-PLUGS & CORES

Most Durable **Lowest Price**

The Steatite Plugs are positively soot-proof and are made with neither steatite, mica or porce lain cores.

The plugs are constructed so any of our cores are *interchangeable* in any of our standard shells.

$1.00 Steatite Spark Plug $1.00

Our construction is right, the workmanship the best and is composed of all the qualities we claim for it. None are genuine unless stamped with our trade-mark.

DEALERS should get in line on the Steatite Spark Plug, because there's an especially good profit coming through the handling, and at the same time it is something that can honestly be recommended. Ask us for our interesting dealers' proposition.

W. WENDTLAND, Manufacturer, 216 Centre St., New York, N. Y.

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REVOLUTIONS PER MINUTE OF AUTO ROAD WHEELS AT DIFFERENT RATES OF SPEED

Miles per hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40
Feet per minute	88	176	264	352	440	528	616	704	792	880	968	1,056	1,144	1,232	1,320	1,418	1,496	1,584	1,672	1,760	....	1,936	....	2,112	....	2,288	....	2,464	....	2,640	3,080	3,520
WHEEL DIAMETER 12	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	....	616	....	672	....	728	....	784	....	840	980	1 120
14	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	....	528	....	576	....	624	....	672	....	720	840	960
16	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	....	462	....	504	....	546	....	588	....	630	735	840
18	18.66	37.33	56	72.66	93.33	112	130.66	145.33	168	186.66	203.33	224	242.66	161.33	280	298.66	317.33	336	354.66	373.33	....	410.66	....	448	....	485.33	....	522.66	....	560	653.33	746.66
20	16.8	32.6	50.4	67.2	84	100.8	117.6	134.4	151.2	168	184.8	201.6	218.4	235.2	252	268.8	285.6	302.4	319.2	336	....	369.6	....	403.2	....	436.8	....	470.4	....	504	588	672
22	15.27	30.54	45.81	61.09	76.36	91.63	106.90	122.18	137.45	152.72	168	183.27	198.54	213.81	229.09	244.36	259.63	274.90	290.18	305.45	....	336	....	366.54	....	397.09	....	427.63	....	458.18	534.54	611.09
24	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	....	308	....	336	....	364	....	392	....	420	490	560
26	12.92	21.84	38.76	51.69	63.61	77.53	90.46	103.38	116.30	129.23	142.15	155.07	168	180.92	193.84	206.76	219.69	232.61	245.53	258.46	....	284.30	....	310.15	....	336	....	361.84	....	397.69	452.30	516.92
28	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	....	264	....	288	....	312	....	336	....	360	420	480
30	11.2	22.4	33.6	44.8	56	67.2	78.4	89.6	100.8	112	123.2	134.4	145.6	156.8	168	179.2	190.4	201.6	212.8	224	....	246.4	....	268.8	....	291.2	....	313.6	....	336	392	448
32	10.5	21	31.5	42	52.5	63	73.5	84	94.5	105	115.5	126	136.5	147	157.5	168	178.5	189	199.5	210	....	231	....	252	....	273	....	294	....	315	367.5	420
34	9.88	19.76	29.64	39.52	49.41	59.29	69.17	79.05	88.94	98.82	108.70	118.58	128.47	138.35	148.23	158.11	168	177.88	187.76	197.64	....	217.41	....	237	....	256.94	....	276.70	....	296.47	345.88	395.29
36	9.33	18.66	28	37.33	46.66	56	65.33	74.66	84	93.33	102.66	112	121.33	130.66	140	149.33	158.66	168	177.33	186.66	....	205.33	....	224	....	242.66	....	261.33	....	280	326.66	373.33
38	8.84	17.68	26.52	35.36	44.21	53.05	61.89	70.73	79.57	88.42	97.27	106.10	114.94	123.78	132.63	141.47	150.31	159.15	168	176.84	....	194.52	....	212.21	....	238.89	....	247.57	....	265.26	309.21	353.42
40	8.4	16.8	25.2	33.6	42	50.4	58.8	67.2	75.6	84	92.4	100.8	109.2	117.6	126	134.4	142.8	151.2	159.6	168	....	184.8	....	201.6	....	218.4	....	235.2	....	252	294	336
42	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	....	176	....	192	....	208	....	224	....	240	280	320
44	7.63	15.27	22.10	30.54	38.18	45.81	53.45	61.00	68.72	76.36	84	91.63	99.27	106.10	114.54	122.18	129.81	137.45	145.00	156.7[illegible]	....	168	....	183.27	....	198.54	....	213.8[illegible]	....	229.[illegible]	267.2[illegible]	305.45

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STEEL
BOXES
FOR TOOLS or BATTERIES
SEVERAL STYLES
MANY SIZES
also
FOOT RESTS and ROBE RAILS
The Globe Machine & Stamping Co.
Cleveland, Ohio.
Ask for "The Silent Partner."

WHEELS

Artillery and Buggy Types

We make these wheels in one grade only, the very highest. They are made from especially selected materials by workmen who know how wheels should be made and who are interested in having them right in every last particular. We are particularly well equipped to make

Automobile Wheels

and shall be pleased to quote you in any quantity and to send you full descriptive matter. We invite your inquiries and promise you prompt and cheerful answer. We believe that it will be to your advantage to get in touch with us.

Hayes Wheel Co., Jackson, Mich.

Makers of the best wheels on earth, proof of which comes to you on request.

SALISBURY WHEELS

Front and Rear
Axles

Send us detailed
information of
your requirements

Salisbury Wheel &
Mfg. Co., Jamestown, N. Y.

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Motor boat measured mile speed table (elapsed time) in nautical miles (admiralty knot = 6,080 feet) and statute miles (5,280 feet) from 1 min. to 8 min. 59 sec., progressively by seconds. For slower speeds divide elapsed time by 2 and divide result by 2.

Seconds	1 Minute	Equivalent in Miles	2 Minutes	Equivalent in Miles	3 Minutes	Equivalent in Miles	4 Minutes	Equivalent in Miles	5 Minutes	Equivalent in Miles	6 Minutes	Equivalent in Miles	7 Minutes	Equivalent in Miles	8 Minutes	Equivalent in Miles
0	60.00	69.06	30.00	34.54	20.00	23.03	15.00	17.27	12.00	13.81	10.00	11.51	8.57	9.86	7.50	8.63
1	59.01	67.95	29.75	34.25	19.89	22.90	14.93	17.20	11.96	13.77	9.97	11.48	8.55	9.84	7.48	8.61
2	58.06	66.86	29.50	33.97	19.78	22.88	14.87	17.12	11.92	13.72	9.94	11.45	8.53	9.82	7.46	8.60
3	57.14	65.80	29 26	33.70	19.67	22.65	14.81	17.05	11.88	13.68	9.91	11.41	8.51	9.80	7.45	8.58
4	56.25	64.77	29.03	33.43	19.56	22.52	14.75	16.98	11.84	13.63	9.89	11.38	8.49	9.77	7.43	8.56
5	55.38	63.77	28.80	33.16	19.45	22.40	14.69	16.92	11.80	13.59	9.86	11.35	8.47	9.75	7.42	8.54
6	54.54	62.80	28.57	32.89	19.35	22.28	14.63	16.85	11.76	13.54	9.83	11.32	8.45	9.73	7.40	8.52
7	53.73	61.87	28.34	32.64	19.25	22.16	14.57	16.78	11.72	13.50	9.80	11.29	8.43	9.70	7.39	8.51
8	52.94	60.96	28.12	32.38	19.14	22.05	14.51	16.71	11.68	13.45	9.78	11.26	8.41	9.68	7.37	8.49
9	52.17	60.07	27.90	32.13	19.04	21.93	14.45	16.64	11 65	13.41	9.75	11.23	8.39	9.66	7.36	8.47
10	51.42	59.21	27.69	31.88	18.94	21.81	14.40	16.58	11.61	13.37	9.73	11.20	8.37	9.64	7.34	8.46
11	50.70	58.38	27.48	31.64	18.84	21.70	14.34	16.51	11.57	13.32	9.70	11.17	8.35	9.61	7.33	8.44
12	50.00	57.57	27.27	31.40	18.75	21.59	14.28	16.45	11.53	13.28	9.67	11 14	8.33	9.59	7.31	8.42
13	49.31	56.78	27.06	31.16	18.65	21.47	14.22	16.38	11.50	13.24	9.65	11.11	8.31	9.57	7.30	8.40
14	48.64	56.01	26.86	30.83	18.55	21.36	14.17	16.32	11.46	13.20	9.62	11.08	8.29	9.55	7.28	8.39
15	48.00	55.27	26.66	30.70	18.46	21.25	14.11	16.25	11.42	13.16	9.60	11.05	8.27	9.52	7.27	8.37
16	47.36	54.54	26.47	30.48	18.36	21.14	14.06	16.19	11.39	13.11	9.57	11.02	8.25	9.50	7.25	8.35
17	46.75	53.83	26.27	30.25	18.27	21.04	14.00	16.13	11.35	13.07	9.54	10.99	8.23	9.48	7.24	8.34
18	46.15	53.14	26.08	30.03	18.18	20.93	13.95	16.06	11.32	13.02	9.52	10.96	8.21	9.46	7.22	8.32
19	45.57	52.47	25.89	29.82	18.09	20.83	13.90	16.00	11.28	12.99	9.49	10.93	8.20	9.44	7.21	8.30
20	45.00	51.81	25.71	29.40	18.00	20.72	13.84	15.94	11.25	12.95	9.47	10.90	8.18	9.42	7.20	8.29
21	44.44	51.17	25.53	29.39	17.91	20.62	13.79	15.88	11.21	12.91	9.44	10.88	8.16	9.39	7.18	8.27
22	43.90	50.55	25.35	29.17	17.82	20.52	13.74	15.82	11.18	12.87	9.42	10.85	8.14	9.37	7.17	8.25
23	43.37	49.94	25.17	28.98	17.73	20.42	13.68	15.76	11.14	12.83	9.39	10.82	8.12	9.35	7.15	8.24
24	42.85	49.34	25.00	28.78	17.64	20.32	13.63	15.70	11.11	12.79	9.37	10.79	8.10	9.33	7.14	8.22
25	42.35	48.76	24.82	28.58	17.56	20.22	13.58	15.64	11.07	12.75	9.35	10.76	8.09	9.31	7.12	8.20
26	41.86	48.20	24.65	28.39	17.47	20.12	13.53	15.58	11.04	12.71	9.32	10.73	8.07	9.29	7.11	8.19
27	41.37	47.64	24.49	28.20	17.39	20.02	13.48	15.52	11.00	12.67	9.30	10.71	8.05	9.27	7.10	8.17
28	40.90	47.10	24.32	28.00	17.30	19.93	13.43	15.46	10.97	12.63	9.27	10.68	8.03	9.25	7.08	8.16
29	40.45	46.57	24.16	27.82	17.22	19.83	13.38	15.41	10.94	12.59	9.25	10.65	8.01	9.23	7.07	8.14
30	40.00	46.06	24.00	27.63	17.14	19.74	13.33	15.35	10.90	12.56	9.23	10.62	8.00	9.21	7.05	8.12
31	39.56	45.55	23.84	27.45	17.06	19.64	13.28	15.29	10.87	12.52	9.20	10.60	7.98	9.19	7.04	8.11
32	39.13	45.05	23.68	27.27	16.98	19.54	13.23	15.24	10.84	12.48	9 18	10.57	7.96	9.17	7.03	8.09
33	38.71	44.57	23.52	27.09	16.90	19.46	13.18	15.18	10.81	12.44	9.16	10.54	7.94	9.15	7.01	8.08
34	38.29	44.10	23.37	26.91	16.82	19.37	13.13	15.12	10.77	12.41	9.13	10.52	7.93	9.13	7.00	8.06
35	37.89	43.63	23.22	26.74	16.74	19.28	13.09	15.07	10 7[illegible]	12.37	9.11	10.49	7.91	9.11	6.99	8.04
36	37.50	43.18	23.07	26.57	16.66	19.19	13.04	15.01	10.71	12.33	9.09	10.46	7.89	9.09	6.97	8.03
37	37.11	42.73	22.93	26.40	16.59	19.10	12.99	14.96	10.68	12.30	9.06	10.44	7.87	9.07	6.96	8.01
38	36.73	42.30	22.78	26.23	16.51	19.01	12.95	14.91	10.65	12.26	9.04	10.41	7.86	9.05	6.95	8.00
39	36.36	41.87	22.64	26.07	16.43	18.92	12.90	14.85	10.61	12.22	9.02	10.38	7.84	9.03	6.93	7.98
40	36.00	41.45	22.50	25.90	16.36	18.84	12.85	14.80	10.58	12.19	9.00	10.36	7.82	9.01	6.92	7.97
41	35.64	41.04	22.36	25.74	16.29	18.75	12.81	14.75	10.55	12.15	8.97	10.33	7.80	8.99	6.91	7.95
42	35.29	40.64	22.22	25.58	16.21	18.67	12.76	14.70	10.52	12.12	8.95	10.31	7.79	8.97	6.89	7.94
43	34.95	40.24	22.08	25.43	16.14	18.58	12.72	14.64	10.49	12.08	8.93	10.28	7.77	8.95	6.88	7.92
44	34.61	39.85	21.95	25.27	16.07	18.50	12.67	14.59	10.46	12.05	8.91	10.26	7.75	8.93	6.87	7.91
45	34.28	39.48	21.81	25.12	16.00	18.42	12.63	14.54	10.43	12.01	8.88	10.23	7.74	8.91	6.85	7.89
46	33.96	39.10	21.68	24.97	15.92	18.34	12.58	14.49	10.40	11.98	8.86	10.21	7.72	8.89	6.84	7.88
47	33.64	38.74	21.55	24.82	15.85	18.26	12.54	14.44	10.37	11.94	8.84	10.18	7.70	8.87	6.83	7.86
48	33.33	38.38	21.42	24.67	15.78	18.18	12.50	14.39	10.34	11.91	8.82	10.16	7.69	8.85	6.81	7.84
49	33.02	38.03	21.30	24.52	15.72	18.10	12.45	14.34	10.31	11.87	8.80	10.13	7.67	8.83	6.80	7.83
50	32.72	37.68	21.17	24.38	15.65	18.02	12.41	14.29	10.28	11.84	8.78	10.11	7.66	8.82	6.79	7.82
51	32.43	37.34	21.05	24.2[illegible]	15.58	17.9[illegible]	12.37	14.24	10.25	11.80	8.75	10.08	7.64	8.80	6.78	7.80
52	32.14	37.01	20.93	24.10	15.51	17.86	12.32	14.19	10.22	11.77	8.73	10.06	7.62	8.78	6.76	7.79
53	31.85	36.68	20.80	23.96	15.45	17.79	12.28	14.14	10.19	11.74	8.71	10.03	7.61	8.76	6.75	7.77
54	31.57	36.36	20.69	23.82	15.38	17.71	12.24	14.10	10.16	11.70	8.69	10.01	7.59	8.74	6.74	7.76
55	31.30	36.08	20.57	23.68	15.31	17.63	1[illegible] 20	14.05	10.14	11.67	8.67	9.98	7.57	8.72	6.72	7.74
56	31.03	35.73	20.45	23.55	15.25	17.56	1 16	14.00	10.11	11.64	8.65	9.96	7.56	8.70	6.71	7.73
57	30.76	35.43	20.33	23.42	15.19	17.49	12.12	13.95	10.08	11.61	8.63	9.94	7.54	8.69	6.70	7.72
58	30.50	35.12	20.22	23.28	15.12	17.41	12.08	13.28	10.05	11.57	8.61	9.91	7.53	8.67	6.69	7.70
59	30.25	34.83	20.11	23.16	15.06	17.34	12.04	13.86	10.02	11.54	8.59	9.89	7.51	8.65	6.67	7.69

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"BREECH BLOCK"

With Improved Clip and Handle

THE PLUG OF CERTAIN RESULTS

The Complete Elimination of Spark Plug Troubles.

No manufacturer can afford to ignore its benefits as a fitment to his cars when they leave the factory. Dealers can make more money—build up better trade and reputation—by pushing the "Breech-block" than with any other plug.

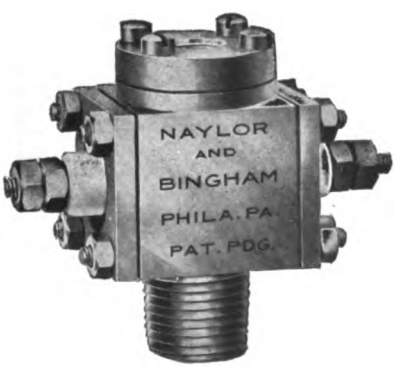
With improved clip and handle is the most efficient, reliable and desirable. Saves time, tools, temper.

The breech-block handle is an insulator and of inestimable convenience and efficiency in testing spark or removing clip from plug.

ADVANTAGES:—**One-sixth** turn of the handle opens. **Entire** porcelain is exposed for cleaning. **One** twist makes instantly white. **Locks** with the push of a finger. **Tight** to 2,000 pounds. **No wrench** to get, use or replace. **Terminal clips** with each plug. **No thumb-nuts** to loosen, no pliers. **Stuffing nut** chambered. **Plugs** held by their handle in testing. **Not** balanced on edge of your engine. **Soot-proof** to the limit. **Unaffected** by oil. **Chambered end** protects porcelain. **Keeps porcelain** fragments from cylinder. **Slightest** piston movement cleans points. **Makes starting easy**; fires first charge. **Big cars** run slow on high gear. **Closely throttled**: not a skip. **Every possible requirement** successfully met. *Write for prices and terms to the trade.*

THE STANDARD COMPANY, Torrington, Conn.

A Dozen Sparks



Not One

IGNITION AND MIXTURE TROUBLES

Can at once be located by the use of the

"NAYLOR" SPARK PLUG

Why? Because you can see the spark and ignition of the mixture while the engine is running. Plug can be entirely insulated from the engine. Write for circular.

PRICE $2.50 EACH

MONEY REFUNDED UPON RETURN OF PLUG IF NOT SATISFACTORY

Our mechanical department at your disposal. Correspondence solicited.

NAYLOR & BINGHAM, 417 Commerce St., Philadelphia, Pa.

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RATE OF SPEED IN MILES PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE FROM ONE TO THREE MINUTES

Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour
Min.	*Sec.*		*Min.*	*Sec.*		*Min.*	*Sec*	
1	0	60.00	1	27	41.38	1	54	31.58
1	1	59.00	1	28	40.91	1	55	31.30
1	2	58.06	1	29	40.45	1	56	31.03
1	3	57.14	1	30	40.00	1	57	30.77
1	4	56.25	1	31	39.56	1	58	30.50
1	5	55.38	1	32	39.13	1	59	30.25
1	6	54.54	1	33	38.71	2	0	30.00
1	7	53.73	1	34	38.29	2	3	29.26
1	8	52.94	1	35	37.89	2	6	28.57
1	9	52.17	1	36	37.50	2	9	27.90
1	10	51.42	1	37	37.11	2	12	27.27
1	11	50.70	1	38	36.73	2	15	26.66
1	12	50.00	1	39	36.36	2	18	26.08
1	13	49.31	1	40	36.00	2	21	25.53
1	14	48.65	1	41	35.64	2	24	25.00
1	15	48.00	1	42	35.29	2	27	24.49
1	16	47.37	1	43	34.95	2	30	24.00
1	17	46.75	1	44	34.61	2	33	23.53
1	18	46.15	1	45	34.28	2	36	23.07
1	19	45.57	1	46	33.96	2	39	22.64
1	20	45.00	1	47	33.64	2	42	22.22
1	21	44.44	1	48	33.33	2	45	21.81
1	22	43.90	1	49	33.03	2	48	21.42
1	23	43.37	1	50	32.72	2	51	21.05
1	24	42.85	1	51	32.43	2	54	20.69
1	25	42.35	1	52	32.14	3	0	20.00
1	26	41.86	1	53	31.86	..	..	.....

SPEED FORMULA

To reduce A miles in B seconds to miles per hour,

$$A \times \frac{3600}{B} = \text{miles per hour.}$$

SPEED EQUIVALENTS IN AMERICAN AND FRENCH MEASUREMENTS

1 mile per hour = 88 ft. per minute.
= 1.46 ft. per second.
= 27.8 metres per minute.
= 0.463 metre per second.
1 km. per hour = 0.624 miles per hour.
= 54.9 ft. per minute.
= 0.914 metre per second.

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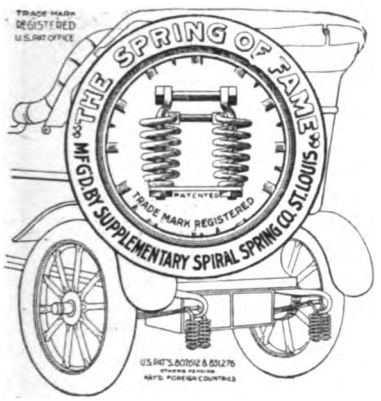


A Word to the Trade

There is but one **Supplementary Spiral Spring** and that is the "spring of fame" made in St. Louis, fully covered by honest patents and honest reliable guarantee. Our patents cover the use of either single or double spiral coil, also the combination of leaf and coil spring.

Our imitators have gone so far as to copy our ORDER BLANKS, imitate our TRADE MARK, as well as other "shady" tactics usually necessary to market an inferior product.

WHAT THEY DO

They increase the **efficiency of your engine.**
They increase the **life of your tires.**
They increase the riding qualities of your car by absorbing **all the injurious vibration.**
They **increase** your comfort wonderfully.
They **prevent broken side springs.**
They prevent dissatisfaction with your car.

SEND FOR 1908 BOOKLET

It's interesting and for your good. Others say so.

BE NOT DECEIVED

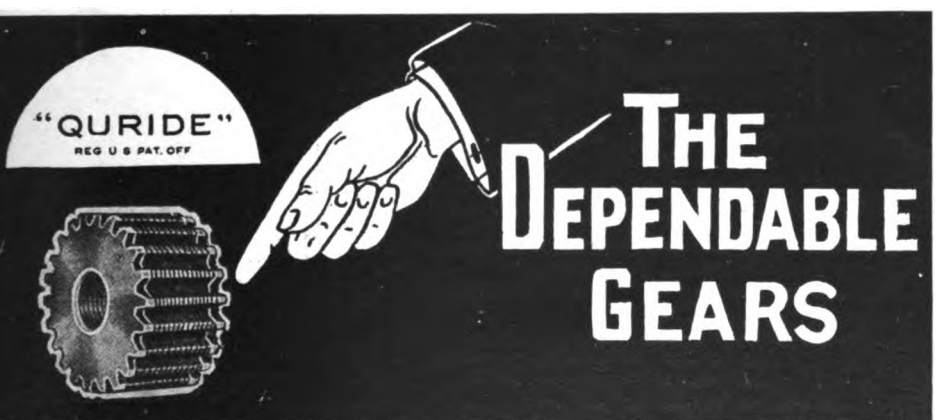
LOOK FOR OUR TRADE MARK AND ST. LOUIS ADDRESS

Supplementary Spiral Spring Co.

Main Office and Factory, ST. LOUIS, MO.

N. Y. Branch, Motor Mart, 1876 Broadway.

Liberal NO-RISK Proposition to the trade.



QURIDE SILENT GEARS

Not raw but cured hide (QURIDE)

The ONLY noiseless gears not affected by grease, oil, or moisture. Guaranteed to outwear all other kinds of filled gears and lengthen the life of metal gears running against them. We solicit your trial orders or inquiries for further information regarding Quride.
Quride is a useful leather for many mechanical appliances.
We are equipped to make your metal gears.

PICROME HIDE COMPANY

Cor. N. Salina and Turtle Sts. :: Syracuse, N. Y.

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Reference Table Showing Equivalent Speed in Miles and Kilometers per Hour for Elapsed Time Over the Measured Mile or Measured Kilometer from 24 Seconds Progressively by 1-5 Second to 59 4-5 Seconds.

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
24	150.00	241.54	24	150.00	93.15
1/5	148.76	239.55	1/5	148.76	92.38
2/5	147.54	237.58	2/5	147.54	91.62
3/5	146.34	235.65	3/5	146.34	90.87
4/5	145.16	233.75	4/5	145.16	90.14
25	144.00	231.88	25	144.00	89.42
1/5	142.86	230.05	1/5	142.86	88.71
2/5	141.73	228.23	2/5	141.73	88.01
3/5	140.62	226.44	3/5	140.62	87.32
4/5	139.53	224.67	4/5	139.53	86.64
26	138.46	222.96	26	138.46	85.98
1/5	137.40	221.25	1/5	137.40	85.32
2/5	136.36	219.58	2/5	136.36	84.68
3/5	135.34	217.94	3/5	135.34	84.04
4/5	134.33	216.31	4/5	134.33	83.42
27	133.33	214.70	27	133.33	82.80
1/5	132.35	213.12	1/5	132.35	82.19
2/5	131.38	211.56	2/5	131.38	81.58
3/5	130.43	210.03	3/5	130.43	80.10
4/5	129.50	208.53	4/5	129.50	80.42
28	128.57	207.03	28	128.57	79.84
1/5	127.66	205.57	1/5	127.66	79.27
2/5	126.76	204.12	2/5	126.76	78.71
3/5	125.87	202.69	3/5	125.87	78.16
4/5	125.00	201.29	4/5	125.00	77.62
29	124.13	199.88	29	124.13	77.08
1/5	123.28	198.52	1/5	123.28	76.55
2/5	122.45	197.18	2/5	122.45	76.04
3/5	121.62	195.84	3/5	121.62	75.52
4/5	120.80	194.52	4/5	120.80	75.01
30	120.00	193.23	30	120.00	74.52
1/5	119.20	191.95	1/5	119.20	74.02
2/5	118.42	190.69	2/5	118.42	73.54
3/5	117.64	189.43	3/5	117.64	73.05
4/5	116.88	188.21	4/5	116.88	72.58
31	116.13	187.00	31	116.13	72.11
1/5	115.38	185.79	1/5	115.38	71.65
2/5	114.65	184.62	2/5	114.65	71.20
3/5	113.90	183.41	3/5	113 90	70.73
4/5	113.21	182.28	4/5	113.21	70.30
32	112.50	181.16	32	112.50	69.86
1/5	111.80	180.03	1/5	111.80	69.43
2/5	111.11	178.92	2/5	111.11	69.00
3/5	110.43	177.82	3/5	110.43	68.57
4/5	109.75	176.73	4/5	109.75	68.15
33	109.09	175.67	33	109.09	67.74
1/5	108.43	174.60	1/5	108.43	67.33
2/5	107.78	173.56	2/5	107.78	66.93
3/5	107.14	172.53	3/5	107.14	66.53
4/5	106.51	171.51	4/5	106.51	66.14
34	105.88	170.50	34	105 88	65.75
1/5	105.26	169.50	1/5	105.26	65.36
2/5	104.65	168.52	2/5	104.65	64.98
3/5	104.04	167.53	3/5	104.04	64.61
4/5	103.45	166.58	4/5	103.45	64.24
35	102.85	165.62	35	102.85	63.87
1/5	102.27	164.68	1/5	102.27	63.51
2/5	101.69	163.75	2/5	101.69	63.15
3/5	101.12	162.83	3/5	101.12	62.79
4/5	100.56	161.93	4/5	100.56	62.44
36	100.00	161.03	36	100.00	62.10
1/5	99.44	160.13	1/5	99.44	61.75
2/5	98.90	159.26	2/5	98.90	61.41
3/5	98.36	158.39	3/5	98.36	61.08
4/5	97.82	157.52	4/5	97.82	60.74
37	97.29	156.67	37	97.29	60.41
1/5	96.77	155.83	1/5	96.77	60.09
2/5	96.25	155.00	2/5	96.25	59.77
3/5	95.74	154.17	3/5	95.74	59.45
4/5	95.23	153.34	4/5	95.23	59.13
38	94.73	152.55	38	94.73	58.82
1/5	94.24	151.75	1/5	94.24	58.52
2/5	93.75	150.96	2/5	93.75	58.22
3/5	93.26	150.17	3/5	93.26	57.91
4/5	92.78	149.40	4/5	92.78	57.61
39	92.30	148.64	39	92.30	57.32
1/5	91.83	147.87	1/5	91.83	57.02
2/5	91.37	147.13	2/5	91.37	56.74
3/5	90.91	146.39	3/5	90.91	56.45
4/5	90.45	145.65	4/5	90.45	56.17
40	90.00	144.92	40	90.00	55.89
1/5	89.55	144.20	1/5	89.55	55.61
2/5	89.11	143.49	2/5	89.11	55.33
3/5	88.67	142.78	3/5	88.67	55.06
4/5	88.23	142.07	4/5	88.23	54.79
41	87.80	141.39	41	87.80	54.52
1/5	87.38	140.70	1/5	87.38	54.26
2/5	86.95	140.01	2/5	86.95	53.99
3/5	86.53	139.34	3/5	86.53	53.73
4/5	86.12	138.68	4/5	86.12	53.48
42	85.71	138.02	42	85.71	53.22
1/5	85.30	137.35	1/5	85.30	52.97
2/5	84.90	136.71	2/5	84.90	52.72
3/5	84.50	136.07	3/5	84.50	52.47
4/5	84.11	135.44	4/5	84.11	52.23
43	83.72	134.81	43	83.72	51.99
1/5	83.33	134.18	1/5	83.33	51.75
2/5	82.95	133.57	2/5	82.95	51.51
3/5	82.57	132.96	3/5	82.57	51.27
4/5	82.19	132.35	4/5	82.19	51.04
44	81.81	131.75	44	81.81	50.80
1/5	81.44	131.14	1/5	81.44	50.5.
2/5	81 08	130.56	2/5	81.08	50.35
3/5	80.71	129.96	3/5	80.71	50.12
4/5	80.35	129.38	4/5	80.35	49.89
45	80.00	128.82	45	80.00	49.68
1/5	79.64	128.24	1/5	79.64	49.45
2/5	79.29	127.68	2/5	79.29	49.24
3/5	78 94	127.11	3/5	78.94	49.02
4/5	78.60	126.57	4/5	78.60	48.81

(Continued on page 414)

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Straight From the Shoulder Talks No. 1

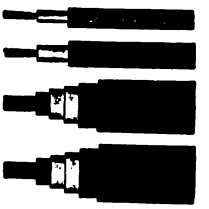
Either you'll specify and handle the Champion Ignition Products in your vicinity and make money doing it, or you won't handle them, but something inferior. But in justice to your customers as well as to yourself, and before you decide, hadn't you better find out wherein "Champion" products are superior?

The Champion products are the best made, and we have a fine, elegant, money-bearing proposition. Now it's your move, and we wouldn't—if we were you—be over-dilatory in making the move.

"Simpell" High Tension Magneto

The simplest magneto made, one that will afford a maximum efficiency always, one that will afford perfect service the year round, a magneto for you to use, because it always brings satisfaction to the buyers of your cars, and the first cost isn't as much as you might think—quality considered.

"Champion" Imported Ignition Wire



This is a special copper wire of high conductivity, with a perfect insulation and of extreme flexibility, oil, heat and water proof. The best wire you can get at any price, the wire you should use on your cars to get best results.

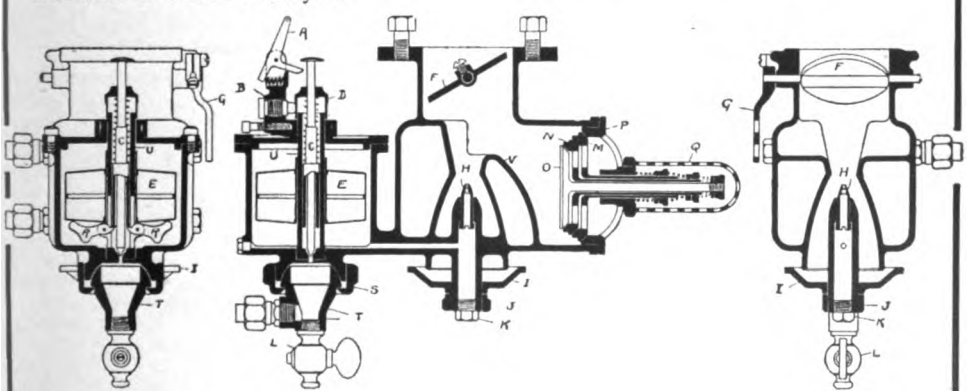
"Champion" Spark Plug

A spark plug of known reliability, correct construction, best of material, strong and able to withstand extreme heat, highest grade of imported porcelain.

ALBERT CHAMPION CO., 38 Whittier St., BOSTON, MASS.

B. G. V. R. CARBURETER

YOU, MR. ENGINEER, look at this We do not give you a lot of Beautiful Sunshine, but we give you your Money's worth and a lot of satisfaction. Look at the sectional view below; write us and give us your say about it. But remember, you say the word and we send you this Carbureter on trial. Give it a fair test and let's hear from you.



We say it does better work than the best, and give us a chance to prove it. Write us and let's get acquainted. We do the rest.

MERCEDES MOTOR MFG. CO., New Kensington, Pa.

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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
46	78.26	126.02	46	78.26	48.60
1/5	77.92	125.47	1/5	77.92	48.39
2/5	77.58	124.92	2/5	77.58	48.17
3/5	77.25	124.39	3/5	77.25	47.97
4/5	76.92	123.86	4/5	76.92	47.76
47	76.59	123.34	47	76.59	47.56
1/5	76.27	122.81	1/5	76.27	47.36
2/5	75.95	122.30	2/5	75.95	47.16
3/5	75.63	121.78	3/5	75.63	46.96
4/5	75.31	121.27	4/5	75.31	46.76
48	75.00	120.77	48	75.00	46.57
1/5	74.68	120.25	1/5	74.68	46.37
2/5	74.38	119.77	2/5	74.38	46.19
3/5	74.07	119.27	3/5	74.07	46.00
4/5	73.77	118.79	4/5	73.77	45.81
49	73.47	118.30	49	73.47	45.62
1/5	73.17	117.82	1/5	73.17	45.44
2/5	72.87	117.34	2/5	72.87	45.25
3/5	72.58	116.87	3/5	72.58	45.07
4/5	72.29	116.40	4/5	72.29	44.89
50	72.00	115.94	50	72.00	44.71
1/5	71.71	115.47	1/5	71.71	44.53
2/5	71.42	115.00	2/5	71.42	44.35
3/5	71.14	114.55	3/5	71.14	44.18
4/5	70.86	114.10	4/5	70.86	44.00
51	70.58	113.67	51	70.58	43.83
1/5	70.31	113.22	1/5	70.31	43.66
2/5	70.04	112.78	2/5	70.04	43.49
3/5	69.76	112.33	3/5	69.76	43.32
4/5	69.49	111.90	4/5	69.49	43.15
52	69.23	111.48	52	69.23	42.99
1/5	68.96	111.04	1/5	68.96	42.82
2/5	68.70	110.62	2/5	68.70	42.66
3/5	68.44	110.21	3/5	68.44	42.50
4/5	68.18	109.79	4/5	68.18	42.34

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
53	67.92	109.38	53	67.92	42.18
1/5	67.66	108.95	1/5	67.66	42.01
2/5	67.41	108.55	2/5	67.41	41.86
3/5	67.16	108.14	3/5	67.16	41.70
4/5	66.91	107.74	4/5	66.91	41.55
54	66.66	107.34	54	66.66	41.39
1/5	66.42	106.95	1/5	66.42	41.24
2/5	66.17	106.55	2/5	66.17	41.09
3/5	65.93	106.16	3/5	65.93	40.94
4/5	65.69	105.78	4/5	65.69	40.79
55	65.45	105.40	55	65.45	40.64
1/5	65.21	105.00	1/5	65.21	40.49
2/5	64.98	104.63	2/5	64.98	40.35
3/5	64.74	104.25	3/5	64.74	40.20
4/5	64.51	103.88	4/5	64.51	40.06
56	64.28	103.52	56	64.28	39.92
1/5	64.05	103.14	1/5	64.05	39.77
2/5	63.83	102.78	2/5	63.83	39.64
3/5	63.60	102.41	3/5	63.60	39.49
4/5	63.38	102.06	4/5	63.38	39.36
57	63.16	101.70	57	63.16	39.22
1/5	62.93	101.33	1/5	62.93	39.08
2/5	62.71	100.98	2/5	62.71	38.94
3/5	62.50	100.64	3/5	62.50	38.81
4/5	62.28	100.29	4/5	62.28	38.67
58	62.07	99.95	58	62.07	38.54
1/5	61.85	99.59	1/5	61.85	38.41
2/5	61.64	99.25	2/5	61.64	38.28
3/5	61.43	98.92	3/5	61.43	38.15
4/5	61.22	98.58	4/5	61.22	38.01
59	61.01	98.24	59	61.01	37.88
1/5	60.81	97.92	1/5	60.81	37.76
2/5	60.60	97.58	2/5	60.60	37.63
3/5	60.40	97.26	3/5	60.40	37.51
4/5	60.20	96.94	4/5	60.20	37.38

Reference Table Showing Equivalent Speed in Miles and Kilometers per Hour for Elapsed Time Over the Measured Mile or Measured Kilometer from 1 Minute to 30 Minutes.

Time for One Mile m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 0	60 00	96.61	1 0	60.00	37.26
1 1	50.00	95.00	1 1	59.00	36.64
1 2	58.06	93.49	1 2	58.06	36.05
1 3	57.14	92.01	1 3	57.14	35.48
1 4	56.25	90.58	1 4	56.25	34.93
1 5	55.38	89.17	1 5	55 38	34.39
1 6	54.54	87.82	1 6	54.54	33.87
1 7	53.73	86.52	1 7	53.73	33.36
1 8	52.94	85.25	1 8	52.94	32.87
1 9	52.17	84.01	1 9	52.17	32.40
1 10	51.42	82.80	1 10	51.42	31.93
1 11	50.70	81.64	1 11	50.70	31.48
1 12	50.00	80.51	1 12	50.00	31.05
1 13	49 31	79.40	1 13	49.31	30.62
1 14	48.65	78.34	1 14	48.65	30.21
1 15	48.00	77.29	1 15	48.00	29.81
1 16	47.37	76.28	1 16	47.37	29.41

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 17	46.75	75.28	1 17	46.75	29.03
1 18	46.15	74.31	1 18	46.15	28.66
1 19	45.57	73.38	1 19	45.57	28.30
1 20	45.00	72.46	1 20	45.00	27.94
1 21	44.44	71.56	1 21	44.44	27.60
1 22	43.90	70.69	1 22	43.90	27.26
1 23	43.37	69.84	1 23	43.37	26.93
1 24	42.85	69.00	1 24	42.85	26.61
1 25	42.35	68.19	1 25	42.35	26 30
1 26	41.86	67.40	1 26	41.86	26.00
1 27	41.38	66.63	1 27	41.38	25.7
1 28	40.91	65.87	1 28	40.91	25.40
1 29	40 45	65.13	1 29	40.45	25.10
1 30	40.00	64.41	1 30	40.00	24.84
1 31	39.56	63.70	1 31	39.56	24.56
1 32	39.13	63.01	1 32	39.13	24.30
1 33	38.71	62.33	1 33	38.71	24.04

(Continued on page 416)

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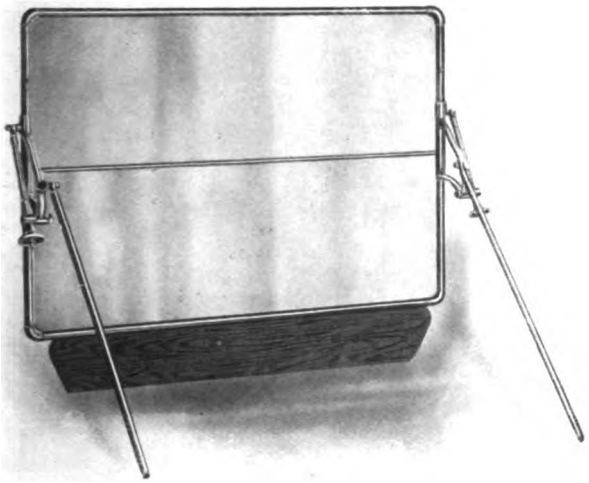
WIND SHIELDS

TWO STYLES
BOTH WINNERS



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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 34	38.29	61.65	1 34	38.29	23.77	3 6	19.35	31.16	3 6	19.35	12.01
1 35	37.89	61.01	1 35	37.89	23.53	3 12	18.75	30.19	3 12	18.75	11.64
1 36	37.50	60.38	1 36	37.50	23.28	3 18	18.18	29.27	3 18	18.18	11.29
1 37	37.11	59.76	1 37	37.11	23.04	3 24	17.64	28.40	3 24	17.64	10.95
1 38	36.73	59.14	1 38	36.73	22.81	3 30	17.14	27.60	3 30	17.14	10.64
1 39	36.36	58.55	1 39	36.36	22.58	3 36	16.66	26.82	3 36	16.66	10.34
1 40	36.00	57.97	1 40	36.00	22.35	3 42	16.21	26.10	3 42	16.21	10.06
1 41	35.64	57.39	1 41	35.64	22.13	3 48	15.79	25.42	3 48	15.79	9.80
1 42	35.29	56.82	1 42	35.29	21.91	3 54	15.38	24.76	3 54	15.38	9.55
1 43	34.95	56.28	1 43	34.95	21.70	4 0	15.00	24.15	4 0	15.00	9.31
1 44	34.61	55.73	1 44	34.61	21.50	4 6	14.63	23.56	4 6	14.63	9.08
1 45	34.28	55.20	1 45	34.28	21.28	4 12	14.28	22.99	4 12	14.28	8.86
1 46	33.96	54.68	1 46	33.96	21.09	4 18	13.95	22.46	4 18	13.95	8.66
1 47	33.64	54.17	1 47	33.64	20.89	4 24	13.63	21.95	4 24	13.63	8.46
1 48	33.33	53.67	1 48	33.33	20.70	4 30	13.33	21.46	4 30	13.33	8.28
1 49	33.03	53.19	1 49	33.03	20.51	4 36	13.04	21.00	4 36	13.04	8.10
1 50	32.72	52.69	1 50	32.72	20.32	4 42	12.76	20.54	4 42	12.76	7.92
1 51	32.43	52.22	1 51	32.43	20.14	4 48	12.50	20.13	4 48	12.50	7.76
1 52	32.14	51.75	1 52	32.14	19.96	4 54	12.24	19.71	4 54	12.24	7.60
1 53	31.86	51.30	1 53	31.86	19.78	5 0	12.00	19.32	5 0	12.00	7.45
1 54	31.58	50.85	1 54	31.58	19.61	5 12	11.54	18.58	5 12	11.54	7.16
1 55	31.30	50.40	1 55	31.30	19.43	5 24	11.11	17.89	5 24	11.11	6.90
1 56	31.03	49.96	1 56	31.03	19.27	5 36	10.71	17.24	5 36	10.71	6.65
1 57	30.77	49.55	1 57	30.77	19.11	5 48	10.34	16.65	5 48	10.34	6.42
1 58	30.50	49.11	1 58	30.50	18.94	6 0	10.00	16.10	6 0	10.00	6.21
1 59	30.25	48.71	1 59	30.25	18.78	6 15	9.60	15.46	6 15	9.60	5.96
2 0	30.00	48.30	2 0	30.00	18.63	6 30	9.23	14.86	6 30	9.23	5.73
2 3	29.26	47.11	2 3	29.26	18.17	6 45	8.88	14.30	6 45	8.88	5.51
2 6	28.57	46.00	2 6	28.57	17.74	7 0	8.57	13.80	7 0	8.57	5.32
2 9	27.90	44.92	2 9	27.90	17.32	7 15	8.27	13.31	7 15	8.27	5.13
2 12	27.27	43.91	2 12	27.27	16.93	7 30	8.00	12.88	7 30	8.00	4.97
2 15	26.66	42.93	2 15	26.66	16.55	7 45	7.74	12.46	7 45	7.74	4.80
2 18	26.08	42.00	2 18	26.08	16.20	8 0	7.50	12.08	8 0	7.50	4.66
2 21	25.53	41.11	2 21	25.53	15.85	8 30	7.06	11.37	8 30	7.06	4.38
2 24	25.00	40.25	2 24	25.00	15.52	9 0	6.66	10.72	9 0	6.66	4.13
2 27	24.49	39.43	2 27	24.49	15.21	9 30	6.31	10.16	9 30	6.31	3.92
2 30	24.00	38.64	2 30	24.00	14.90	10 0	6.00	9.66	10 0	6.00	3.72
2 33	23.53	37.89	2 33	23.53	14.61	10 30	5.71	9.19	10 30	5.71	3.54
2 36	23.07	37.15	2 36	23.07	14.32	11 0	5.45	8.77	11 0	5.45	3.38
2 39	22.64	36.45	2 39	22.64	14.06	11 30	5.21	8.39	11 30	5.21	3.23
2 42	22.22	35.78	2 42	22.22	13.80	12 0	5.00	8.05	12 0	5.00	3.10
2 45	21.81	35.12	2 45	21.81	13.54	13 0	4.61	7.42	13 0	4.61	2.86
2 48	21.42	34.49	2 48	21.42	13.31	14 0	4.28	6.89	14 0	4.28	2.66
2 51	21.05	33.89	2 51	21.05	13.07	15 0	4.00	6.44	15 0	4.00	2.48
2 54	20.69	33.31	2 54	20.69	12.85	20 0	3.00	4.83	20 0	3.00	1.86
2 57	20.34	32.75	2 57	20.34	12.63	30 0	2.00	3.22	30 0	2.00	1.24
3 0	20.00	32.20	3 0	20.00	12.42						

REVERSIBLE CHEMICAL EQUATIONS SHOWING CHANGES WHICH TAKE PLACE IN THE LEAD STORAGE BATTERY (LAMAR LYNDON)

CHARGE

$$\longleftarrow$$

(a) $PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O$

(b) $Pb + H_2SO_4 = PbSO_4 + H_2$

(c) $c = (a) + (b) = PbO_2 + Pb + 2H_2SO_4 = 2PbSO_4 + 2H_2O$ (a)

$$\longrightarrow$$

DISCHARGE

Equation (*a*) expresses the reactions at the positive plate; (*b*) those at the negative, and (*c*) the combined effect is the fundamental equation of the lead storage battery.

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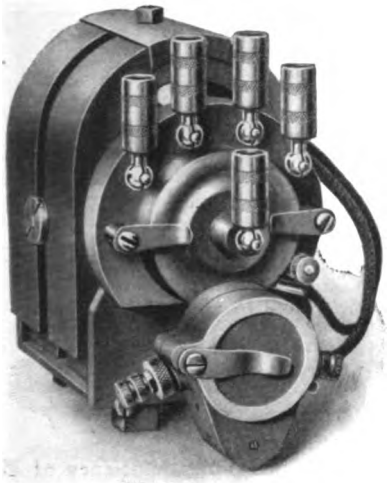
NEW REMY MAGNETO TYPE "L"



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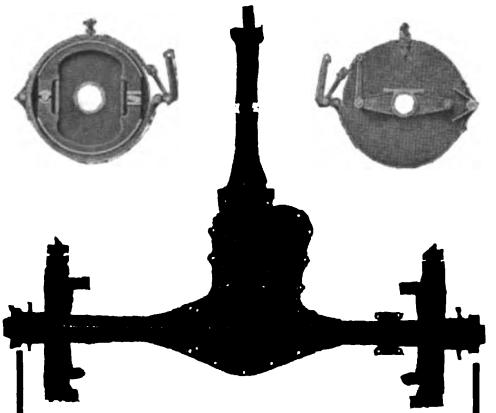

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HILL-CLIMBING FORMULAS (WORBY BEAUMONT)

W = Weight of car and load in pounds.
w = Weight of car and load in tons.
H = Total ascent in feet.
L = Length of hill in feet.
R = Road resistance in pounds per ton weight of car and load.
r = Air resistance in pounds = $V^2 A$ 0.0017.
V = Velocity of car in feet per second.
A = Area of car in square feet presented to air resistance.
T = Time occupied in ascent in seconds.
E = Efficiency of transmission of power from engine to road wheels.
$H.P.$ = Effective horse power of engine.
p = Power given off at road wheels or work done in ascending hill.
S = Speed of ascent in miles per hour

Then if P = Mean effective cylinder pressure
L = Length of stroke in feet.
A = Area of piston in square inches.
N = Number of useful or firing strokes per minute,

the brake horse-power of petrol or steam engines, having a mechanical efficiency of E, is

$$\frac{EPLAN}{33000}$$

For compound steam engines the number of useful working strokes are those occurring in the low-pressure cylinder, and the mean effective pressure in the high-pressure cylinder or cylinders is referred to the area of the low-pressure cylinder.

The power given off at the road wheels during the ascent of the hill is

$$p = \frac{HW + (R\,w + r)\,L}{T\ 550}$$

and the brake horsepower required at the engine with a selected value of E is

$$HP = \frac{HW + (R\,w + r)\,L}{TE\ 550}$$

With the other conditions known, the efficiency may be found from

$$E = \frac{HW + (R\,w + r)\,L}{HP.\ T\ 550}$$

the speed of the ascent in miles per hour from

$$S = \frac{\dfrac{L}{HWL + (R\,w + r)}}{HP.\ E\ 550}\ L \times 1.466$$

and the time occupied in the ascent from

$$T = \frac{HW + (R\,w + r)\,L}{HP.\ E\ 550}$$

Unless the probable speed of the car is high, or the wind velocity such that the pressure upon the surface of the car presented to air resistance opposing motion approaches that due to the speed of the car through still air, then the quantity r may be omitted from the foregoing expressions without introducing more than slight error

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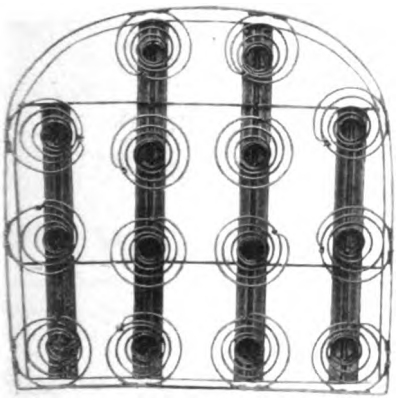
ROYAL ARCH CUSHION SPRINGS



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This Soft Edge

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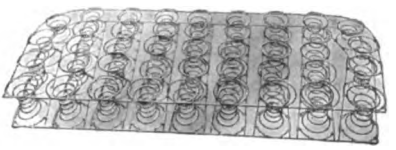

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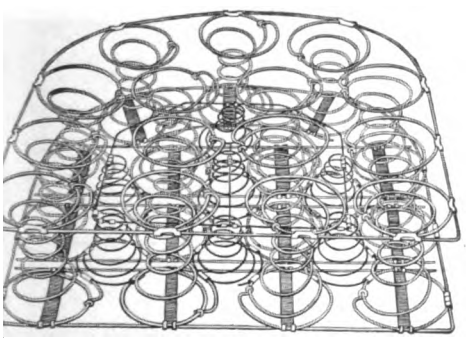

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AND
Rough Rider Springs

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VENTILATED CUSHION & SPRING CO., Jackson, Mich.

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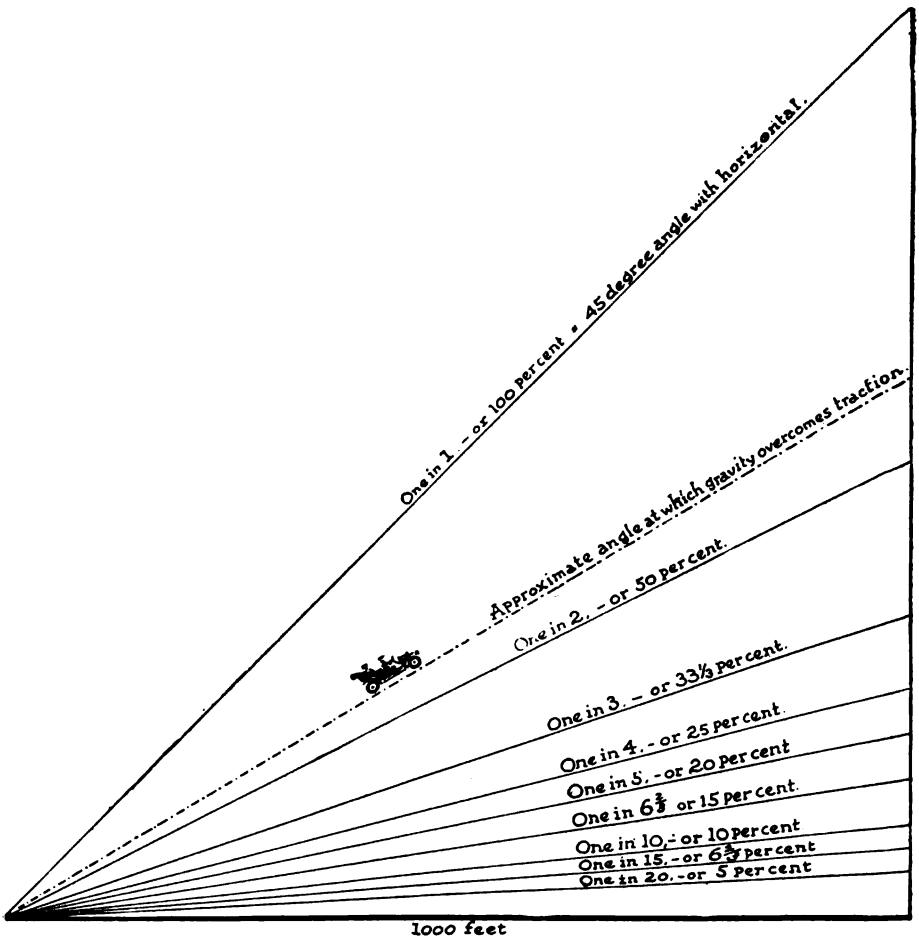
MEASUREMENT OF GRADES



ILLUSTRATING METHOD OF CALCULATING GRADE PERCENTAGES

If it be assumed that the base of the triangle represents a line 1,000 feet long and that the first sloping line represents a road having a rise that brings it 50 feet above the starting point, this is figured as 50 feet in a thousand, or 5 per cent. In other words, one foot of rise for every 20 feet, but the latter instance does not mean distance actually traveled by a car in ascending such a slope, but distance measured horizontally with reference to that slope. The grade is measured by the tangent of the angle of inclination and not by its sine, so that a grade which represents 100 per cent. corresponds to an angle of inclination of but 45 degrees, and not 90 degrees, or perpendicular, as is commonly supposed. At the upper end of the next sloping line the elevation would amount to 66⅔ feet, which is equivalent to a rise of one foot for every 6⅔ feet traveled horizontally. So one in three corresponds to a 33 1-3 per cent. grade, one in two to a 50 per cent. grade, and so on until a 100 per cent. grade is reached, which, as noted, is the equivalent of a 45 degree angle.

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SPECIAL SMALL, FLAT SPRINGS

OF ANY SHAPE FOR ANY PURPOSE

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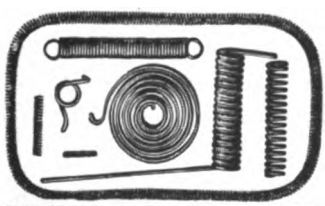

Compression
Torsion

M. D. HUBBARD SPRING COMPANY, Pontiac, Michigan

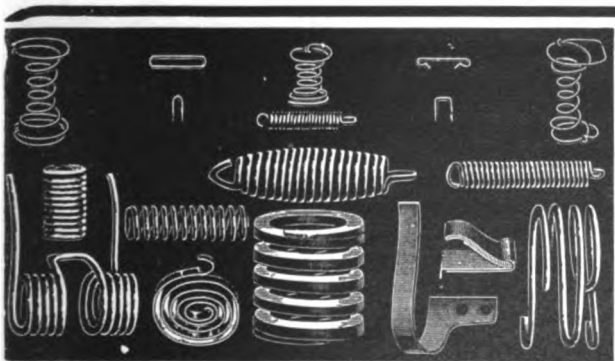

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TABLE OF GRADIENTS

GRADE		Equal to Angle of	Rise or Fall in One Mile, Feet
Per Cent	Units		
20	1 in 5	11° 19′	1056
17	1 " 6	9° 26′	880
14	1 " 7	8° 09′	754
12.5	1 " 8	7° 08′	635
11	1 " 9	6° 17′	586
10	1 " 10	5° 43′	528
9	1 " 11	5° 11′	480
8	1 " 12	4° 46′	440
7.75	1 " 13	4° 24′	406
7	1 " 14	4° 05′	337
6.5	1 " 15	3° 49′	352
6.25	1 " 16	3° 35′	330
6	1 " 17	3° 22′	310
5.5	1 " 18	3° 11′	293
5	1 " 19	3° 00′	277
5	1 " 20	2° 52′	204
4	1 " 25	2° 18′	218
3.3	1 " 30	1° 55′	155
2.8	1 " 35	1° 38′	151
2.5	1 " 40	1° 26′	132

COMPOUND EQUIVALENTS

Atmosphere (14.7 lbs. per square inch) = 1.0335 kilogrammes per square centimetre.

1 Foot-pound = 0.1382 kilogrammetre.

1 lb. per square inch = 0.0703077 kilogramme per square centimetre = 0.7031 gramme p.r square millimetre = 5.170 centimetres of mercury at 0 degree Centigrade.

1 Kilogramme per square millimetre = 1422.32 lbs. per square inch = 0.635 ton per square inch.

1 Kilogramme per square centimetre = 14.2232 lbs. per square inch.

1 Gramme per square millimetre = 1.422 lbs. per square inch.

1 Kilogrammetre = 7.233 foot-pounds.

1 Gramme per square centimetre = 0.01422 lb. per square inch.

1 Calorie or French unit of heat = 3.968 British Thermal Units.

French mechanical equivalent of heat (425 kilogrammetres) = 3,074 foot-pounds per unit

1 Calorie per square metre = 0.369 heat-unit per square foot.

1 Calorie per kilogramme = 1.800 heat-units per lb.

English unit of heat, or heat-unit = 0.252 calorie.

English mechanical equivalent to one heat-unit (778 foot-pounds) = 10.67 kilogrammetres.

1 English heat-unit per square foot = 2.713 calories per square metre.

1 English heat-unit per lb. = 5-9 calorie per kilogramme.

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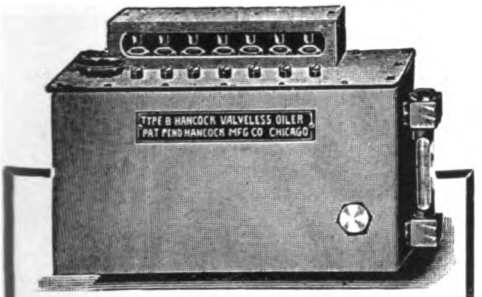

EVERY COMPETITIVE TEST AND CONTINUOUS USE PROVES THAT

HANCOCK MECHANICAL OILERS

EXCEL ALL OTHERS AND PERFORM THEIR WORK BETTER AND MORE ECONOMICALLY

No complicated device to get out of order, but a neat, compact oiler that never fails to work perfectly and economize in oil consumption.

These are features motorists appreciate and cars so equipped sell better and dealers can greatly increase their profits and satisfy their trade by pushing the sale of Hancock Oilers.

Liberal discounts to manufacturers and dealers. Write us.

HANCOCK MANUFACTURING CO

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McCORD MFG. CO.

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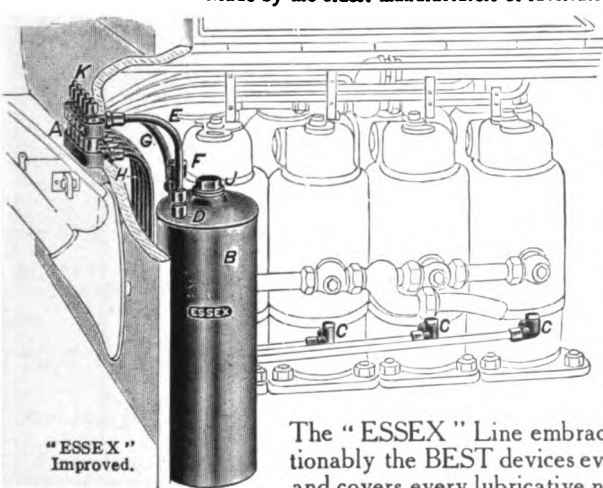
FORCE FEED LUBRICATORS
RADIATORS
CARBURETORS
WIRE BELTING
SPARK PLUGS
CIRCULATING PUMPS
McKIM COPPER ASBESTOS GASKETS

"ESSEX'S" AUTOMATIC LUBRICATORS

Made by the oldest manufacturers of lubricators in America



"ESSEX" Improved.

Automatic Lubrication is conceded the ONLY successful method of lubricating automobiles. They not only add to your pleasure but reduce your expenses.

ALWAYS READY AND NEVER GET OUT OF ORDER

The "ESSEX" Line embraces unquestionably the BEST devices ever invented and covers every lubricative need. They are not complicated devices full of springs, valves, etc., to get out of order, but are simple in construction and certainly perform their functions perfectly. Their use eliminates all oiling troubles.

LET US SEND YOU FULL PARTICULARS AND PRICES.

The G. B. ESSEX BRASS CO., 480-2 Franklin St., Detroit, Mich.

USEFUL ENGINEERING DATA

Water weighs 62.4 pounds per cubic foot, and 8.3 pounds per gallon.

There are 7.5 gallons in a cubic foot of water

Gasoline has a specific gravity of .72, and consequently weighs 5.96 pounds per gallon. This applies to 76° gasoline.

A foot-pound represents the work required to raise a weight of one pound to a height of one foot. There are 33,000 foot-pounds to a horsepower.

A British Thermal Unit represents the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39° F. Its symbol is B. T. U.

There are 778 foot-pounds in a B. T. U.

There are 42.4 B. T. U. to a horsepower.

The thermal efficiency of a good internal combustion motor is from 30 to 35 per cent.

The mechanical efficiency of a good internal combustion motor should be between 85 and 90 per cent.

On direct drive, with an efficient transmission and differential, about 88 per cent. of the power furnished by the motor should be delivered at the rear wheels

Under the best conditions, about 75 per cent of the indicated horsepower of the engine should be available for useful work.

If the work performed at the rear wheels is reduced to heat units, it will be found that about 23 per cent. of the energy represented by the heating value of the fuel is available as useful work.

The piston speed of a motor should not exceed 1,000 feet per minute.

The peripheral velocity of a cast iron flywheel should not exceed 5,000 feet per minute Should it exceed this speed, there would be danger of the flywheel bursting from centrifugal force.

USEFUL FUNCTIONS OF π

$\pi = 3.14159265$	$\frac{\pi}{7} = 0.44879895$	$\pi^2 = 9.86960440$	$\sqrt{\pi} = 1.77245385$
$\frac{\pi}{2} = 1.57079633$	$\frac{\pi}{16} = 0.19634954$	$\pi^3 = 31.00627668$	$\sqrt[3]{\pi} = 1.46459189$
$\frac{\pi}{3} = 1.04719755$	$\frac{\pi}{24} = 0.13089969$	$\frac{1}{\pi} = 0.31830989$	$\frac{1}{\sqrt{\pi}} = 0.56418958$
$\frac{\pi}{4} = 0.78539816$	$\frac{\pi}{32} = 0.09817477$	$\frac{1}{\pi^2} = 0.10132118$	$\frac{1}{\sqrt[3]{\pi}} = 0.68278406$
$\frac{\pi}{6} = 0.52359878$	$\frac{\pi}{180} = 0.01754329$	$\frac{1}{\pi^3} = 0.03225153$	$\text{Log } \pi = 0.49714987$

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THE
PERFECTION
SPRING COMPANY

Auto. Spring Specialists

CLEVELAND, OHIO

Low-Cambered—Semi-Elliptic

OUR NAME HAS BECOME A SYNONYM FOR QUALITY IN SPRINGS

ANY TYPE TO ORDER FROM

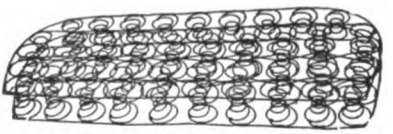
VANADIUM
KRUPP &
CRUCIBLE
STEEL

Send Us Your Spring Troubles

THE WING PATTERN

CUSHION SPRING

shown below is used by all the leading manufacturers of Automobiles in the East and has stood the test of ten years service with satisfaction alike to makers of Cars as well as users.



Cushion Spring (Wing Pattern) for Auto Seats

Manufactured by

THE CHARLES WING CO.

Amesbury, Mass. U. S. A.

Manufacturers of Auto Top Straps and Straps and Trimmings of many varieties, also wholesale dealers in all classes of Automobile Upholstering materials.

ESTABLISHED 1845.

THE DUNBAR BROTHERS CO.

MANUFACTURERS OF

STEEL (OIL TEMPERED) SPRINGS

ALL KINDS OF

SMALL SPRINGS

MADE FROM SHEET STEEL & STEEL & BRASS WIRE

BRISTOL, CONN.

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PROPERTIES OF GASOLINE AND DENATURED ALCOHOL (MUNTZ)

Properties	Gasoline	Denatured Alcohol
Carbon	84.3 per cent.	41.5 per cent.
Hydrogen	15.7 per cent.	13.0 per cent.
Oxygen	.....	45.5 per cent.
Density at 15° C.	.708	.834
Boiling point	88° C.	78.5° C.
Calories per Kg	*11,359.65	‡6,521.75
Weight evaporated per hour per dm.² (15.5 sq. in.) of surface:		
1. In experiment room; 18° C.	9.37 g. (0.33 oz.)	3.47 g. (0.12 oz.)
2. Outside in the sun; 25° C.	47.21 g. (1.66 oz.)	27.08 g. (0.95 oz.)

* 1,302 British heat units per lb. ‡ 752 British heat units per lb.

TESTS WITH BRITISH MOTOR FUEL

GASOLINE AND BENZOL TESTS

Six-Cylinder Napier Engine

	Specific Gravity	Temperature of Testing Room, Fahr.	Average of Three Tests, B.H.P.	Remarks
Ordinary gasoline	.687	67.1	64.25	
" "	.699	69.8	64.4	
" "	.713	65.3	64.4	
" "	.714	60.8	65.5	
" "	.759	67.1	63.5	
Benzol	.873	75.2	64.1	Exhaust has a sulphurous, pungent smell. Engine started quite easily.

PROPERTIES OF GASES

(1*)	(2*)	(3*)	(4*)	(5*)
Hydrogen	H	.0692	.00559	52230
Oxygen	O	1.106	.08921	.....
Nitrogen	N	.971	.07831	.....
Carbon Monoxide	CO	.967	.07807	4380
Carbon Dioxide	CO_2	1.529	.12267	.....
Dry Air	.....	1.000	.08072	.....
Water Vapor	H_2O	.625	.05020	.....
Acetylene	C_2H_2	.915	.07251	20673
Methane	CH_4	.554	.04464	21385
Ethylene	C_2H_2	.974	.07805	20025
Alcohol	C_2H_6O	1.601	.12598	12000

*1 Gases.
*2 Chemical Formula or Symbol
*3 Density (Air = 1).
*4 Weight per cubic foot under standard conditions.
*5 Heating values per pound in B. T. U.

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THE
LOCKWOOD PRIMER

WILL START YOUR MOTOR ON THE FIRST REVOLUTION

Easily Attached to Dash of Your Car and Connected to Intake Pipe with Copper Tubing

Only Two Holes to Drill and One to Tap

ONE TRIAL

and you will never do without it

SEND FOR OUR TRIAL OFFER

PRICE **$5.00**

LOCKWOOD BROS.
101 W. Pearl St., Jackson, Mich.

La Porte BODIES

First-class Bodies, either wood or metal, painted and upholstered complete.

We will furnish design or build to blue prints submitted.

AUTOMOBILE TOPS

for the trade a specialty.

Address Automobile Department,

LaPorte Carriage Co.
LaPorte, Ind.

The Greatest Invention Ever Solved for Automobile Tires

Eliminates all possibility of tire troubles and breakdowns, with the incidental worry, trouble delays and expense from punctures.

The
Faultless Auto Tubes

Consist of a set of tubes—three inside a fourth—so you can have four punctures in any one tire before you are in trouble, and that doesn't happen, but as a precaution you can carry an extra set. The operation is simple and the cost is low.

No Auto Manufacturer should fail to investigate. No Auto Supply Dealer who has his interest at heart can afford to let this get by him, and every user should know all about this new and wonderful tire.

WRITE TO US
We will cheerfully furnish full facts.

The Faultless Auto Tube Co.
Thoroughfare Bldg., Broadway and 58th Street, NEW YORK

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SPECIFIC GRAVITIES CORRESPONDING TO BAUME SCALE AT 60° FAH.

Baumé Degrees	Specific Gravity	Baumé Degrees	Specific Gravity
63	0.728	72	0.695
64	0.724	73	0.692
65	0.720	74	0.689
66	0.717	75	0.685
67	0.713	76	0.682
68	0.709	77	0.679
69	0.706	78	0.675
70	0.702	79	0.672
71	0.699	80	0.669

TABLE OF APPROXIMATE CAPACITIES IN LIQUID GALLONS

1	2	3	4	5	6	7	8	9	10	Gallons	Gal'ns per Inch
5 x 12	6x18	6x24	6x36	6x42						6" diam'r	.122
	7x12	7x18	7x24	7x30	7x36	7x42	7x48			7" "	.165
		8x15	8x18	8x24	8x30	8x36	8x42	8x45	8x48	8" "	.217
		9x12	9x15	9x18	9x24	9x30	9x34	9x36	9x40	9" "	.275
					10x20	10x24	10x26	10x28	10x32	10" "	.340
						12x16	12x18	12x20	12x24	12" "	.486

10	15	20	25	30	35	40	45	50	Gallons	Gal'ns per Inch
8x48									8" diam'r	.217
9x40									9" "	.275
10x32	10x48								10" "	.340
12x24	12x34	12x42	12x50	12x60					12" "	.486
14x18	14x24	14x30	14x38	14x44	14x52	14x60			14" "	.666
	16x18	16x24	16x30	16x36	16x42	16x48	16x54	16x60	16" "	.870

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ALUMINUM, BRASS AND BRONZE

We make Carbureters, Robe Rails, Glass Front Fixtures, Door Hinges, Aluminum Mouldings, Propellers, Rudders, Tillers, etc.

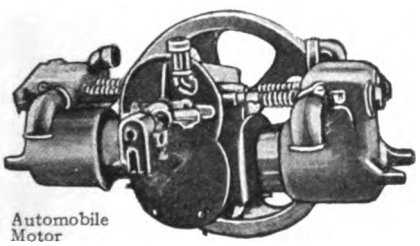
AUTOMOBILE AND MOTOR BOAT CASTINGS

Finished parts of every description. Work guaranteed satisfactory.

ESSEX BRASS FOUNDRY CO.

Write for Prices. **2 Carriage Ave., AMESBURY, MASS.**

MOTORS AUTOMOBILE AND MARINE

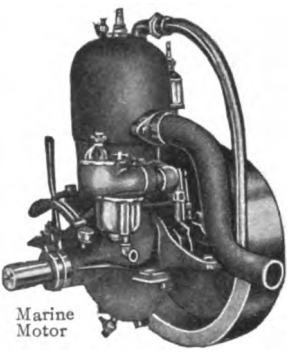


Automobile Motor

Two-cylinder opposed water cooled automobile motor, 12 H.P., furnished with pump, timer and carbureter.

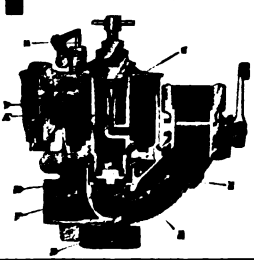
Single cylinder 5 H.P. Marine Motor, two cycle, water cooled, pump, timer and carbureter. Send for descriptive circular.

Schaub & Son Machine Co.
3084 Henshaw Avenue
Cincinnati Ohio.



Marine Motor

Palmbla 'Syphon' Carburetor

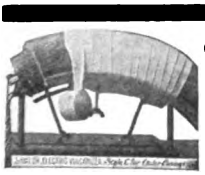


1909 MODEL NOW READY

FLEXIBLE CHOKE TUBE and ONE AIR INTAKE

creates complete vaporization at all motor speeds. We are ready to prove our claims. Write for particulars.

THE NORTH CHICAGO MACHINE CO.
NORTH CHICAGO, - - - - - ILLINOIS



"It's the only Vulcanizer on the Market."

That's what Carriers' AUTO STATION of Middletown, Conn., thinks of

SHALER ELECTRIC VULCANIZERS

20 minutes time—½ cent for current—A dollar earned

"A REGULAR GOLD MINE"

Says the Wichita Automobile Co.

Write for booklet **C. A. SHALER CO., Box X, Waupun, Wis., U. S. A.**

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TABLE FOR THE DIVISION OF THE CIRCUMFERENCE

Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius	Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius
3	120	1.73206	52	6.55	0.120356
4	90	1.41422	53	6.47	0.118032
5	72	1.17558	54	6.40	0.11629
6	60	1	55	6.32	0.113966
7	51.25	0.86732	56	6.25	0.111644
8	45	0.76536	57	6.18	0.1099
9	40	0.68404	58	6.12	0.108158
10	36	0.61804	59	6.06	0.106414
11	32.43	0.563	60	6	0.104672
12	30	0.51764	61	5.54	0.102928
13	27	0.4782	62	5.48	0.101186
14	25	0.4448	63	5.42	0.099442
15	24	0.41582	64	5.37	0.0977
16	22.30	0.39018	65	5.32	0.096538
17	21.10	0.36734	66	5.27	0.094794
18	20	0.3473	67	5.22	0.093632
19	18.56	0.32894	68	5.17	0.091888
20	18	0.31286	69	5.13	0.090765
21	17.08	0.29792	70	5.08	0.089564
22	16.21	0.2841	71	5.04	0.088402
23	15.39	0.272	72	5	0.087238
24	15	0.26106	73	4.55	0.085496
25	14.24	0.25066	74	4.51	0.084332
26	13.50	0.24086	75	4.48	0.083752
27	13.20	0.23218	76	4.44	0.083588
28	12.51	0.22352	77	4.40	0.081426
29	12.24	0.216	78	4.36	0.080264
30	12	0.20906	79	4.33	0.0791
31	11.36	0.20212	80	4.30	0.078518
32	11.15	0.19574	81	4.26	0.077356
33	10.54	0.18996	82	4.23	0.076194
34	10.35	0.18416	83	4.20	0.075612
35	10.17	0.17894	84	4.17	0.07445
36	10	0.17432	85	4.14	0.073868
37	9.43	0.1691	86	4.11	0.072706
38	9.28	0.16504	87	4.08	0.072124
39	9.13	0.1604	88	4.05	0.070962
40	9	0.15692	89	4.02	0.07033
41	8.46	0.15286	90	4.	0.069798
42	8.34	0.14938	91	3.57	0.0686362
43	8.22	0.1459	92	3.54	0.0680546
44	8.10	0.14242	93	3.52	0.0674732
45	8	0.13952	94	3.49	0.0663104
46	7.49	0.13603	95	3.47	0.0657288
47	7.39	0.133128	96	3.45	0.0651474
48	7.30	0.130806	97	3.42	0.064566
49	7.20	0.127904	98	3.40	0.0639844
50	7.12	0.125582	99	3.38	0.63403
51	7.03	0.122678	100	3.36	0.0628216

This table should be useful for gear and chain wheel calculation and design

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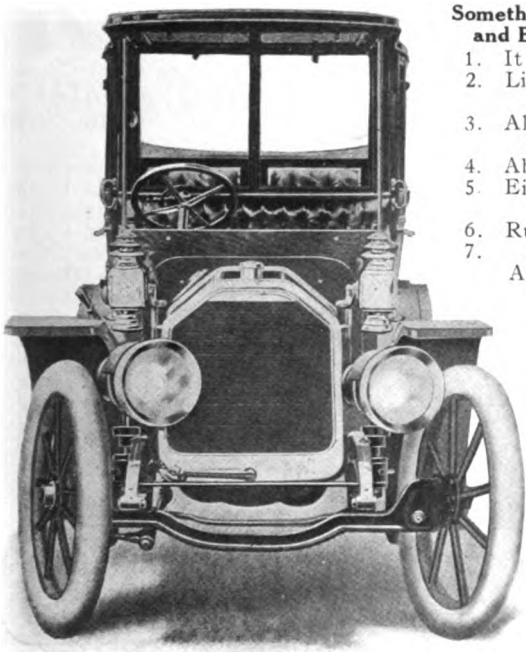
CIRCLE ROTARY AUTOMOBILE LIGHT



Something New Every Automobilist will Want and Buy for these eleven good reasons:

1. It shows the way and prevents accidents.
2. Lights automatically turn in direction the automobile is about to go.
3. All curves fully lighted before you round them.
4. Absolutely no vibration.
5. Either one or both lights may be adjusted to swing.
6. Runs on ball bearings; no drag on steering gear.
7. Any style of lamp may be used.
8. Easy to operate.
9. Lights directly connected to drop arm of steering gear.
10. Perfect control guaranteed.
11. An ornament to any car.

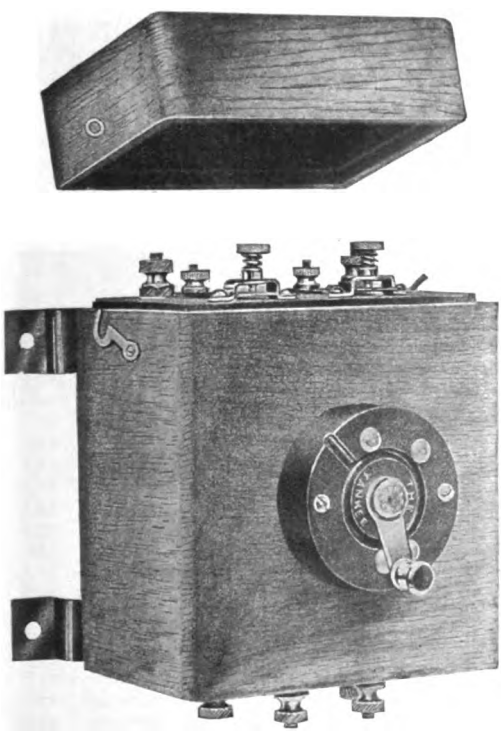
Auto Manufacturers—This is something that you should know all about and should be on all your cars. An improvement that will at tract trade.

Auto Supply Dealers—Here is a device just a little pushing will make fine business for you. You ought to have our agency proposition.

Write to us—write to-day

Circle Rotary Automobile Light Co.

Box 354 GREAT NECK, L. I.



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especially designed

For Motor Buggies

More Power—Longer Life—Greatest Durability

The construction is the very simplest, being of the non-unit type equipped with our single adjustment vibrator which is very rapid, easy to adjust and free from lock nuts.

If you want a coil that is giving universal satisfaction and will please you better than any other, try this one. It is elegantly finished in ½-inch oak and the material and workmanship throughout are the best obtainable.

We guarantee this coil to ignite any motor perfectly using under 125 pounds compression per square inch and to be economical in current consumption. Any coils which do not prove satisfactory will be replaced or money refunded. Made in single, double, triple and quadruple.

Either the L-B or S-L vibrator furnished as standard equipment.

Write to-day for full information and prices. They will interest you.

SPECIAL! Our MAG-NO IGNITER

will be ready soon. This is an invention you should know all about—the greatest ignition invention of the age. This device is used in place of the magneto and eliminates its disadvantages. The details cannot be told here. Write to us—it's important to you—write to-day.

Special price inducement on our products to manufacturers, dealers and jobbers.

LEMKE-BRIGGS ELECTRIC CO., Milwaukee, Wisconsin

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CIRCUMFERENCES AND AREAS OF CIRCLES

Advancing by Eighths

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
1/64	.04909	.00019	2 3/8	7.4613	4.4301	6 1/8	19.242	29.465
1/32	.09818	.00077	7/16	7.6576	4.6664	1/4	19.635	30.680
3/64	.14726	.00173	1/2	7.8540	4.9087	3/8	20.028	31.919
1/16	.19635	.00307	9/16	8.0503	5.1572	1/2	20.420	33.183
3/32	.29452	.00690	5/8	8.2467	5.4119	5/8	20.813	34.472
1/8	.39270	.01227	11/16	8.4430	5.6727	3/4	21.206	35.785
5/32	.49087	.01917	3/4	8.6394	5.9396	7/8	21.598	37.122
3/16	.58905	.02761	13/16	8.8357	6.2126	7	21.991	38.485
7/32	.68722	.03758	7/8	9.0321	6.4918	1/8	22.384	39.871
			15/16	9.2284	6.7771	1/4	22.776	41.282
1/4	.78540	.04909				3/8	23.169	42.718
9/32	.88357	.06213	3	9.4284	7.0686	1/2	23.562	44.179
5/16	.98175	.07670	1/16	9.6211	7.3662	5/8	23.955	45.664
11/32	1.0799	.09281	1/8	9.8175	7.6699	3/4	24.347	47.173
3/8	1.1781	.11045	3/16	10.014	7.9798	7/8	24.740	48.707
13/32	1.2763	.12962	1/4	10.210	8.2958	8	25.133	50.265
7/16	1.3744	.15033	5/16	10.407	8.6179	1/8	25.525	51.849
15/32	1.4726	.17257	3/8	10.603	8.9462	1/4	25.918	53.456
			7/16	10.799	9.2806	3/8	26.311	55.088
1/2	1.5708	.19635	1/2	10.996	9.6211	1/2	26.704	56.745
17/32	1.6690	.22166	9/16	11.192	9.9678	5/8	27.096	58.426
9/16	1.7671	.24850	5/8	11.388	10.321	3/4	27.489	60.132
19/32	1.8653	.27688	11/16	11.585	10.680	7/8	27.882	61.862
5/8	1.9635	.30680	3/4	11.781	11.045	9	28.274	63.617
21/32	2.0617	.33824	13/16	11.977	11.416	1/8	28.667	65.397
11/16	2.1598	.37122	7/8	12.174	11.793	1/4	29.060	67.201
23/32	2.2580	.40574	15/16	12.370	12.177	3/8	29.452	69.029
			4	12.566	12.566	1/2	29.845	70.882
3/4	2.3562	.44179	1/16	12.763	12.962	5/8	30.238	72.760
25/32	2.4544	.47937	1/8	12.959	13.364	3/4	30.631	74.662
13/16	2.5525	.51849	3/16	13.155	13.772	7/8	31.023	76.589
27/32	2.6507	.55914	1/4	13.352	14.186	10	31.416	78.540
7/8	2.7489	.60132	5/16	13.548	14.607	1/8	31.809	80.516
29/32	2.8471	.64504	3/8	13.744	15.033	1/4	32.201	82.516
15/16	2.9452	.69029	7/16	13.941	15.466	3/8	32.594	84.541
31/32	3.0434	.73708	1/2	14.137	15.904	1/2	32.987	86.590
			9/16	14.334	16.349	5/8	33.379	88.664
1	3.1416	.7854	5/8	14.530	16.800	3/4	33.772	90.763
1/16	3.3379	.8866	11/16	14.726	17.257	7/8	34.165	92.886
1/8	3.5343	.9940	3/4	14.923	17.728	11	34.558	95.033
3/16	3.7306	1.1075	13/16	15.119	18.190	1/8	34.950	97.205
1/4	3.9270	1.2272	7/8	15.315	18.665	1/4	35.343	99.402
5/16	4.1233	1.3530	15/16	15.512	19.147	3/8	35.736	101.62
3/8	4.3197	1.4849	5	15.708	19.635	1/2	36.128	103.87
7/16	4.5160	1.6230	1/16	15.904	20.129	5/8	36.521	106.14
1/2	4.7124	1.7671	1/8	16.101	20.629	3/4	36.914	108.43
9/16	4.9087	1.9175	3/16	16.297	21.135	7/8	37.306	110.75
5/8	5.1051	2.0739	1/4	16.493	21.648	12	37.699	113.10
11/16	5.3014	2.2365	5/16	16.690	22.166	1/8	38.092	115.47
3/4	5.4978	2.4053	3/8	16.886	22.691	1/4	38.485	117.86
13/16	5.6941	2.5802	7/16	17.082	23.221	3/8	38.877	120.28
7/8	5.8905	2.7612	1/2	17.279	23.758	1/2	39.270	122.72
15/16	6.0868	2.9483	9/16	17.475	24.301	5/8	39.663	125.19
			5/8	17.671	24.850	3/4	40.055	127.68
2	6.2832	3.1416	11/16	17.868	25.406	7/8	40.448	130.19
1/16	6.4795	3.3410	3/4	18.064	25.967	13	40.841	132.73
1/8	6.6759	3.5466	13/16	18.261	26.535	1/8	41.233	135.30
3/16	6.8722	3.7583	7/8	18.457	27.109	1/4	41.626	137.89
1/4	7.0686	3.9761	15/16	18.653	27.688	3/8	42.019	140.50
5/16	7.2649	4.2000	6	18.850	28.274	1/2	42.412	143.14

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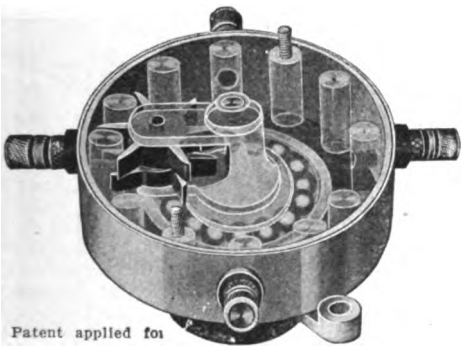
ROCH-O TIMER

Has a DOUBLE ROTARY WIPE CONTACT



and several new points of Superiority

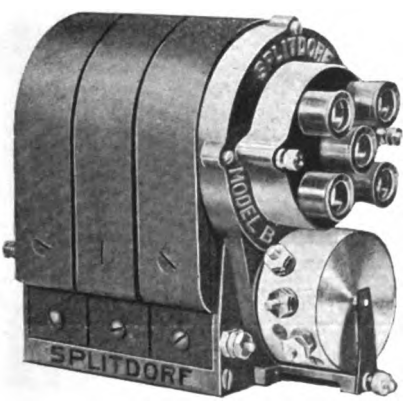
Has no adjustments to bother with. Has ball bearings top and bottom and is high-grade in every respect.

Write for descriptive circular and trade discounts

ROCHESTER TIMER COMPANY

COX BLDG. ROCHESTER, N. Y.

Don't Buy a Cheap Magneto



It is dear at any price.

Although costing somewhat more than others, the

SPLITDORF Magneto

is in proportion to *real value* received by its user

The Most Moderate-Priced Magneto Extant

Be guided by the great majority of discriminating motorists who have always found SPLITDORF Ignition the best

Chicago: 319 Michigan Ave.
San Francisco: 520 Van Ness Ave.

C. F. SPLITDORF
Walton Ave. and 138th St.
Branch, 1679 Broadway, **NEW YORK**

Boston: Motor Mart 220 Pleasant St.
Detroit: 886 Woodward Ave.

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AREAS OF SMALL CIRCLES.

Diameter	Areas									
	.00	.01	02	.03	.04	.05	06	.07	.08	.09
.0	.0	.000078	.00031	.0007	.00125	.00196	.00283	.00385	.00503	.00636
.1	.0078	.0095	.0113	.0133	.0154	.0177	.0201	.0227	.0255	.0283
.2	.0314	.03464	.038	.0415	.0452	.0491	.0531	.0572	.0616	.066
.3	.0706	.0755	.0804	.0855	.0903	.0962	.1018	.1075	.1134	.1195
.4	.1256	.132	.1385	.1452	.1520	.1590	.1662	.1735	.181	.1886
.5	.1963	.2043	.2124	.2206	.2290	.2376	.2463	.2552	.2642	.2734
.6	.2827	.2922	.3014	.3117	.3217	.3318	.3421	.3526	.3632	.3739
.7	.3848	.3959	.4071	.4185	.4301	.4418	.4536	.4657	.4778	.4902
.8	.5026	.5153	.5281	.5411	.5542	.5674	.5809	.5945	.6082	.6221
.9	.6362	.6504	.6648	.6793	.694	.7088	.7238	.739	.7543	.7698

TABLE OF DECIMAL EQUIVALENTS OF VULGAR FRACTIONS OF AN INCH IN COMMON USE

	1/64	.0156		17/64	.2656		33/64	.5156		49/64	.7656
	1/32	.0312		9/32	.2812		17/32	.5312		25/32	.7812
	3/64	.0468		19/64	.2968		35/64	.5468		51/64	.7968
1/16		.0625	5/16		.3125	9/16		.5625	13/16		.8125
	5/64	.0781		21/64	.3218		37/64	.5781		53/64	.8281
	3/32	.0937		11/32	.3437		19/32	.5937		27/32	.8437
	7/64	.1093		23/64	.3593		39/64	.6093		55/64	.8593
1/8		.125	3/8		.375	5/8		.625	7/8		.875
	9/64	.1406		25/64	.3906		41/64	.6406		57/64	.8906
	5/32	.1562		13/32	.4062		21/32	.6562		29/32	.9062
	11/64	.1718		27/64	.4218		43/64	.6718		59/64	.9218
3/16		.1875	7/16		.4375	11/16		.6875	15/16		.9375
	13/64	.2031		29/64	.4531		45/64	.7031		61/64	.9531
	7/32	.2187		15/32	.4687		23/32	.7187		31/32	.9687
	15/64	.2343		31/64	.4843		47/64	.7343		63/64	.9843
1/4		.25	1/2		.5	3/4		.75	1		1.0

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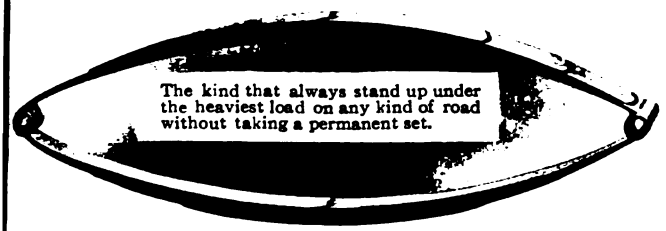
SPRINGS

FOR BUSINESS
FOR PLEASURE

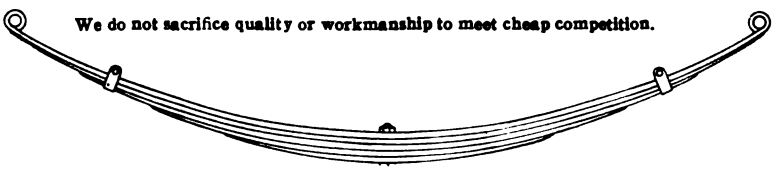


Require a full knowledge of spring materials and methods of making. We add to these a guarantee. Our experience is yours for the asking.

The Cleveland-Canton Spring Co.
CANTON, OHIO, U. S. A.

AUTOMOBILE LEAF SPRINGS

We do not sacrifice quality or workmanship to meet cheap competition.



Every spring is rigorously tested, inspected and recorded, so that a duplicate can be secured at any time. We have crucible steel, experienced, highest skilled mechanics and up-to-date equipment.

Established 1880.

TUTHILL SPRING CO., 213 W. Polk Street, Chicago

IMPORTANT TO EVERY AUTOMOBILE MANUFACTURER REBUILDER AND REPAIRMAN

YOU can better your cars—establish a reputation for easiest riding and longest wear, consequently sell them to better advantage and greater profit by equipping with

BURNET COMPOUND SPRINGS

The main advantage to you is the great saving of tires, engine and chassis—all of which also appeals to the buyer as well as the fact that Burnet Compound Springs produce the easiest riding cars. It is the only Spring that meets successfully every condition of road and speed.

SIMPLE, STRONG, ELASTIC, FLEXIBLE, DURABLE, EASILY APPLIED

The *only* adjustable spring—no side sway—*a shock absorber in itself*—permits the use of solid tires and doubles the amount of traction. You can't afford not to know all about the spring and its advantage to your product.

Write to us to-day—all information cheerfully furnished.

THE BURNET COMPOUND SPRING, Inc.
738 Broad Street Newark, N. J.

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FORMULAS FOR CONVERSION OF THERMOMETER SCALES

To convert degrees, Centigrade or Réaumur, into degrees Fahrenheit:

Let F = No. of degrees Fahrenheit.
C = " " " Centigrade.
R = " " " Réaumur.

$$F = \frac{9C}{5} + 32; \qquad F = \frac{9R}{4} + 32;$$

$$C = \frac{5(F - 32)}{9} \qquad R = \frac{4(F - 32)}{9}$$

Freezing point, or 32° Fah. = zero in Cent. or Réaumur.
Boiling point, or 212° Fah. = 100° Cent., or 80° Réaumur.

DECIMAL FRACTIONS OF A LINEAL INCH IN MILLIMETRES.

Inch	Milli-metres	Inch	Milli-metres	Inch	Milli-metres	Inches	Milli-metres
.01	.254	.29	7.366	.57	14.478	.85	21.590
.02	.508	.30	7.620	.58	14.732	.86	21.844
.03	.762	.31	7.874	.59	14.986	.87	22.098
.04	1.016	.32	8.128	.60	15.240	.88	22.352
.05	1.270	.33	8.382	.61	15.494	.89	22.606
.06	1.254	.34	8.636	.62	15.748	.90	22.860
.07	1.778	.35	8.890	.63	16.002	.91	23.114
.08	2.032	.36	9.114	.64	16.256	.92	23.368
.09	2.286	.37	9.398	.65	16.510	.93	23.622
.10	2.540	.38	9.652	.66	16.764	.94	23.876
.11	2.794	.39	9.906	.67	17.018	.95	24.130
.12	3.048	.40	10.160	.68	17.272	.96	24.384
.13	3.302	.41	10.414	.69	17.526	.97	24.638
.14	3.556	.42	10.668	.70	17.780	.98	24.892
.15	3.810	.43	10.922	.71	18.034	.99	25.146
.16	4.064	.44	11.176	.72	18.288	1.00	25.400
.17	4.318	.45	11.430	.73	18.542	2.00	50.799
.18	4.572	.46	11.684	.74	18.796	3.00	76.199
.19	4.826	.47	11.938	.75	19.050	4.00	101.599
.20	5.080	.48	12.192	.76	19.304	5.00	126.999
.21	5.334	.49	12.446	.77	19.558	6.00	152.399
.22	5.588	.50	12.700	.78	19.812	7.00	177.799
.23	5.842	.51	12.945	.79	20.066	8.00	203.199
.24	6.096	.52	13.208	.80	20.320	9.00	228.599
.25	6.350	.53	13.462	.81	20.574	10.00	253.999
.26	6.604	.54	13.716	.82	20.828	11.00	279.399
.27	6.858	.55	13.970	.83	21.082	12.00 =1 foot	304.79
.28	7.112	.56	14.224	.84	21.336		

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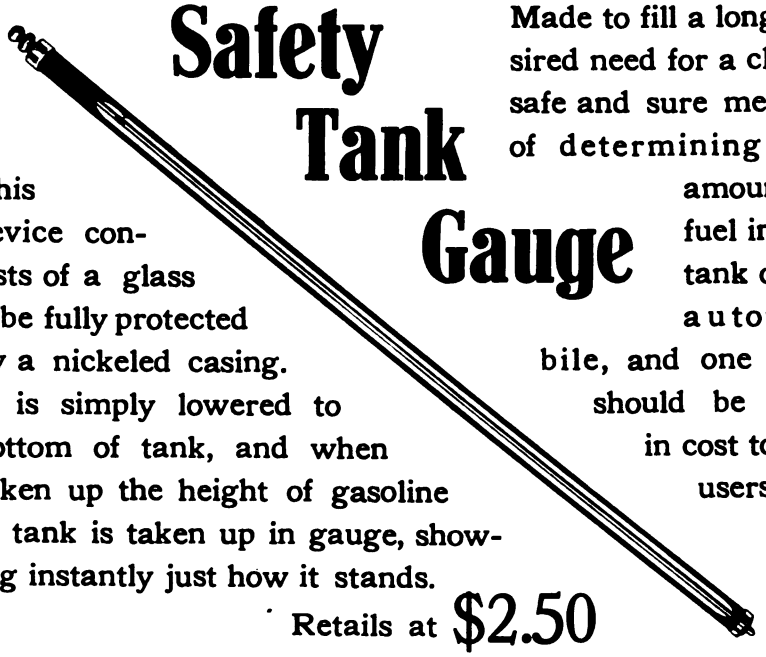
Safety Tank Gauge

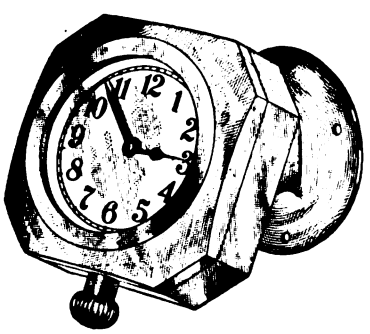


Made to fill a long desired need for a clean, safe and sure method of determining the amount of fuel in the tank of an automobile, and one that should be little in cost to the users.

This device consists of a glass tube fully protected by a nickeled casing. It is simply lowered to bottom of tank, and when taken up the height of gasoline in tank is taken up in gauge, showing instantly just how it stands.

Retails at $2.50

"Volta" Clock



The nicest little automobile clock made, and thoroughly reliable in every way. It is a high-grade watch movement enclosed in a water and dust proof solid case, and four small dollars put you in possession of one. $4.00

There is a good, big profit to the dealer on both of these articles, and it will pay any dealer to get our Special Dealers' Proposition. Ask for it to-day.

GORDON AUTOMOBILE SUPPLY CO., Inc.

1024 Boylston Street, BOSTON, MASS.

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UNITED STATES OFFICIAL MILLIMETERS CONVERSION TABLE

Millimeters	Equivalent in Inches	Millimeters	Equivalent in Inches
1	0.03,937	51	2.00,787
2	0.07,874	52	2.04,724
3	0.11,811	53	2.08,661
4	0.15,748	54	2.12,598
5	0.19,685	55	2.16,535
6	0.23,622	56	2.20,472
7	0.27,559	57	2.24,409
8	0.31,496	58	2.28,346
9	0.35,433	59	2.32,283
10	0.39,370	60	2.36,220
11	0.43,307	61	2.40,157
12	0.47,244	62	2.44,094
13	0.51,181	63	2.48,031
14	0.55,118	64	2.51,968
15	0.59,055	65	2.55,905
16	0.62,992	66	2.59,842
17	0.66,929	67	2.63,779
18	0.70,866	68	2.67,716
19	0.74,803	69	2.71,653
20	0.78,740	70	2.75,590
21	0.82,677	71	2.79,527
22	0.86,614	72	2.83,464
23	0.90,551	73	2.87,401
24	0.94,488	74	2.91,338
25	0.98,425	75	2.95,275
26	1.02,362	76	2.99,212
27	1.06,299	77	3.03,149
28	1.10,236	78	3.07,086
29	1.14,173	79	3.11,023
30	1.18,110	80	3.14,960
31	1.22,047	81	3.18,897
32	1.25,984	82	3.22,834
33	1.29,921	83	3.26,771
34	1.33,858	84	3.30,708
35	1.37,795	85	3.34,645
36	1.41,732	86	3.38,582
37	1.45,669	87	3.42,519
38	1.49,606	88	3.46,456
39	1.53,543	89	3.50,393
40	1.57,480	90	3.54,330
41	1.61,417	91	3.58,267
42	1.65,354	92	3.62,204
43	1.69,291	93	3.66,141
44	1.73,228	94	3.70,078
45	1.77,165	95	3.74,015
46	1.81,102	96	3.77,952
47	1.85,039	97	3.81,889
48	1.88,976	98	3.85,826
49	1.92,913	99	3.89,763
50	1.96,850	100	3.93,700

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TIRE INSURANCE

BY GETTING THE

MYHTIB OVERCOAT

WHICH WILL PRESERVE THEIR LIFE

¶ Every motorist has from two to three tires in reserve. They are constantly losing life. "Myhtib" Tire Overcoat will save them for you, at the same time put dollars in your pocket. When you put your motor away in the Fall, no matter in how good a condition your tires may be at that time, the air will suck the life out of them, leaving them dry, brittle and worthless.

¶ You have paid at the lowest $50.00 each for them, $200.00 in all. By applying but $5.00 worth of "Myhtib" Tire Overcoat you will save that money.

2 pound cake of "Myhtib" Composition
8 ounce bottle of "Myhtib" Preserver
One brush . . . . . .
ALL FOR **$5.00**

¶ The "Myhtib" Inner Tube Patch is another money saver. Will stick quicker and stronger than any other in the world. Already cemented for instant use. Only best quality of rubber used. Can be put on in three minutes. No dirty or sticky cement. One size only, $2\frac{3}{4}$ x $2\frac{3}{8}$ inches, five in a box, $1.00.

WRITE FOR CIRCULAR

"MYHTIB" COMPOSITION CO.

286 Asylum Street Room 4 **HARTFORD, CONN.**

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POUNDS PER SQUARE INCH IN KILOGRAMMES PER SQUARE CENTIMETRE.

Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre
1	.0703	41	2.8826	81	5.6949	205	14.4129
2	.1406	42	2.9529	82	5.7652	210	14.7645
3	.2109	43	3.0232	83	5.8355	215	15.1160
4	.2812	44	3.0935	84	5.9058	220	15.4675
5	.3515	45	3.1638	85	5.9761	225	15.8191
6	.4218	46	3.2341	86	6.0464	230	16.1706
7	.4921	47	3.3044	87	6.1167	235	16.5221
8	.5624	48	3.3747	88	6.1870	240	16.8737
9	.6328	49	3.4450	89	6.2573	245	17.2252
10	.7031	50	3.5153	90	6.3276	250	17.5767
11	.7734	51	3.5856	91	6.3979	255	17.9283
12	.8437	52	3.6559	92	6.4682	260	18.2798
13	.9140	53	3.7263	93	6.5385	265	18.6313
14	.9843	54	3.7966	94	6.6088	270	18.9829
15	1 0546	55	3.8669	95	6.6722	275	19.3344
16	1.1249	56	3.9372	96	6.7495	280	19.6860
17	1.1952	57	4.0075	97	6.8198	285	20.0375
18	1.2655	58	4.0778	98	6.8901	290	20.3890
19	1.3358	59	4.1481	99	6.9604	295	20.7406
20	1.4062	60	4.2184	100	7.0307	300	21.0921
21	1.4764	61	4.2887	105	7.3822	310	21.7951
22	1.5467	62	4.3590	110	7.7338	320	22.4981
23	1.6171	63	4.4293	115	8.0853	330	23.2012
24	1.6874	64	4.4996	120	8.4368	340	23.9043
25	1.7577	65	4.5699	125	8.7884	350	24.6073
26	1.8280	66	4.6402	130	9.1399	360	25.3104
27	1.8983	67	4.7106	135	9.4914	370	26.0135
28	1.9686	68	4.7809	140	9.8430	380	26.7166
29	2.0389	69	4.8512	145	10.1945	390	27.4196
30	2.1092	70	4.9215	150	10.5460	400	28.1227
31	2.1795	71	4.9918	155	10.8976	410	28.8258
32	2.2498	72	5.0621	160	11.2491	420	29.5288
33	2.3201	73	5.1324	165	11.6006	430	30.2319
34	2.3905	74	5.2027	170	11.9522	440	30.9350
35	2.4607	75	5.2730	175	12.3037	450	31.6380
36	2.5310	76	5.3433	180	12.6553	460	32.3411
37	2.6013	77	5.4136	185	13.0068	470	33.0442
38	2.6717	78	5.4939	190	13.3583	480	33.7437
39	2.7420	79	5.5542	195	13.7099	490	34.4503
40	2.8123	80	5.6246	200	14.0614	500	35.1533

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HEALY LEATHER TIRES

DO NOT Puncture, Skid, Rim-Cut, Blow Out

HEALY INNER TUBES

Made of tough, heavy red rubber Will not deteriorate in Three Years

PUNCTURES REPAIRED FREE OF CHARGE FOR ONE YEAR

HEALY DETACHABLE TIRE GRIPS

Prevent Skidding Do not injure the Tire

Wear longer than any other Grip Quiet running

Easily attached

HEALY LEATHER TIRE COMPANY

1906 Broadway - 90 Gold Street New York

Branches: **1251 Michigan Avenue, Chicago**
10 Columbus Avenue, Boston
344 Cumberland Street, Brooklyn

Standard Metal Mfg. Co.

Chestnut, Jefferson and Malvern Streets

Newark, N. J.

STANDARD

The largest manufacturers of Horns in the United States. We make a full line of

Auto and Phonograph HORNS

Also Flexible Tubing and Supplies. Write for catalogue.

Our trade-mark guarantees quality; best workmanship.

The horns we manufacture are equal in every respect to anything sold in this country,—not excepting those of French manufacture.

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A CONVENIENT METRIC CONVERSION.

(COMPILED BY C. W. HUNT)

Millimeters × .03937 = inches.
Millimeters ÷ 25.4 = inches.
Centimeters × .3937 = inches.
Centimeters ÷ 2.54 = inches.
Meters = 39.37 inches. (Act of Congress.)
Meters × 3.281 = feet.
Meters × 1.094 = yards.
Meter per second = 196.86 feet per minute.
Kilometers × .621 = miles.
Kilometers × 3280.7 = feet.
Square Millimeters × .00155 = square inches.
Square Millimeters ÷ 645.1 = square inches.
Square Centimeters × .155 = square inches.
Square Centimeters ÷ 6.451 = square inches.
Square Meters × 10.764 = square feet.
Square Kilometers × 247.1 = acres.
Hectares × 2.471 = acres.
Cubic Centimeters ÷ 16.383 = cubic inches.
Cubic Meters × 35.315 = cubic feet.
Cubic Meters × 1.308 = cubic yards.
Cubic Meters × 264.2 = gallons (231 cubic inches).
Liters × 61.022 = cubic inches. (Act of Congress.)
Liters × .2642 = gallons (231 cubic inches).
Liters ÷ 3.78 = gallons (231 cubic inches)
Liters ÷ 28.316 = cubic feet.
Grammes × 15.432 = grains. (Act of Congress.)
Grammes (water) ÷ 29.57 = fluid ounces.
Grammes ÷ 28.35 = ounces avoirdupois.
Grammes per cubic cent. ÷ 27.7 = pounds per cubic inch.
Joule × .7373 = foot pounds.
Kilograms × 2.2046 = pounds.
Kilograms × 35.3 = ounces avoirdupois.
Kilograms ÷ 1102.3 = tons (2,000 pounds).
Kilograms per square millimeters × 1422.3 = pounds per square inch
Kilograms per square cent. × 14 223 = pounds per square inch.
Kilo-watts × 1.34 = horse-power.
Watts ÷ 746 = horse-power.
Caloric × 3.968 = B. T. U.
Cheval vapeur × .9863 = horse-power.
(Centigrade × 1.8) + 32 = degrees Fahrenheit.
Francs × .193 = dollars.

FRENCH AND AMERICAN EQUIVALENT MEASURES

MEASURES OF LENGTH

French	*United States*
1 meter	39.37 inches, or 3.28083 feet
.3048 meter	1 foot
1 centimeter	.3937 inch
2.54 centimeters	1 inch
1 millimeter	.03937 inch, or 1/25 inch nearly
25.4 millimeters	1 inch
1 kilometer	1093.61 yards, or .62137 mile

(Continued on page 444)

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THE ATWATER KENT SPARK GENERATOR

is the only ignition device in the world which needs no auxiliary to be always reliable.

SEND FOR CATALOG

ATWATER KENT MANUFACTURING WORKS
44 NORTH 6th STREET, PHILADELPHIA, PA.

"VELOS" TIMERS and DISTRIBUTORS

Automobile and Marine Timers of tested and approved construction. Made in all styles and sizes, in plain or ball bearings. Special devices built to order to meet unusual requirements.

Workmanship and material guaranteed. Our timers and distributors are designed to give perfect synchronism and with the least consumption of current. Care is also given to insure mechanical strength and lasting qualities.

Descriptive matter mailed on request.

Philadelphia Timer and Machine Co.

Office and Salesroom, 328 Vine St., Factory 327 New St., Philadelphia, Pa.

IDEAL SWITCHES ARE THE ONLY SWITCHES

having spring locking contacts. They are 100% efficency and FOOL PROOF when blade is removed, as shown in cut.

Our No. 500 A with and without cap. Note contacts we make. Ten different styles of ignition switches.

Get our lists and prices

IDEAL SWITCH CO., Plainville, Conn.

J. D. KEARNEY,
Monadnock Block, Chicago, Ill.
Western Representative

F. R. MORSE
335 Broadway, N. Y.
New York City and Vicinity.

COLUMBIA IGNITOR

"Red Top" Dry Cells give a hot, snappy spark, recuperate rapidly and have long life; qualities which are very essential to successful ignition.

A trial will convince you of their excellence

NATIONAL CARBON COMPANY, Cleveland, O.

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MEASURES OF WEIGHT

1 gramme	15.432 grains
.0648 gramme	1 grain
28.35 grammes	1 ounce avoirdupois
1 kilogramme	2.2046 pounds
.4536 kilogramme	1 pound
1 tonne or metric ton	.0842 ton of 2,240 pounds 19.68 cwt.
1000 kilogrammes	2204.6 pounds

MEASURES OF CAPACITY

1 liter (1 cubic decimeter)	61.023 cubic inches .03531 cubic foot .2642 gallon (American) 2.202 pounds water at 62° F.
28.317 liters	1 cubic foot
4.543 liters	1 gallon (British)
3.785 liters	1 gallon (American)

TABLE OF KILOGRAMME CALORIES, EQUIVALENT TO BRITISH THERMAL UNITS

Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l
0	.....	.252	.504	.756	1.008	1.260	1.512	1.764	2.016	2.268	0
10	2.52	2.772	3.024	3.276	3.528	3.780	4.032	4.284	4.536	4.788	10
20	5.04	5.292	5.544	5.796	6.048	6.300	6.552	6.804	7.056	7.308	20
30	7.56	7.812	8.064	8.316	8.568	8.820	9.072	9.324	9.576	9.828	30
40	10.08	10.332	10.584	10.836	11.088	11.340	11.592	11.844	12.096	12.348	40
50	12.60	12.852	13.104	13.356	13.608	13.860	14.112	14.364	14.616	14.868	50
60	15.12	15.372	15.624	15.876	16.128	16.380	16.632	16.884	17.136	17.388	60
70	17.64	17.892	18.144	18.396	18.648	18.900	19.152	19.404	19.656	19.908	70
80	20.16	20.412	20.664	20.916	21.168	21.420	21.672	21.924	22.176	22.428	80
90	22.68	22.932	23.184	23.436	23.688	23.940	24.192	24.444	24.696	24.948	90
Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l

1 British thermal unit = 251.996 therms, or gramme calories.

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Standard Roller Bearing Company

50th St. and Lancaster Ave., Philadelphia

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Steel, Bronze and Brass Balls. ...CAPACITY... 500,000,000 ANNUALLY

AMERICAN WIRE LOCK WASHERS

National Pattern

Made in all sizes and weights for automobile construction.

We have a special process, special machinery and if you will give us the opportunity, can quote you prices that will interest you.

Plain Pattern

Samples furnished free for test.

HOBBS MANUFACTURING CO., WORCESTER, MASS.

RADIAL

"STAR" Ball Retainers

Manufactured by

THE STAR BALL RETAINER CO. Inc.

LANCASTER, PA.

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The Easy Running Car runs on

"HESS-BRIGHTS"

The World's Ball Bearings

If the car you are considering has them you may be sure of its quality.

Anyway write to us to-day for full particulars—they'll interest you.

The Hess-Bright Manufacturing Co.

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LIST OF NINE DIFFERENT STANDARD GAUGES USED IN THE UNITED STATES

DECIMAL EQUIVALENTS (Inches)

No. of Gauge	American or Brown & Sharpe Iron Wire	Birmingham or Stubbs Iron Wire	Washburn & Moen Iron Wire	Imperial Wire Gauge	U. S. Standard for Plate (Iron & Steel)	Stubbs Steel Wire	Twist Drill and Steel Wire	Washburn & Moen Music Wire	Wood and Machine Screws	No. of Gauge	Fractional Parts of an Inch	Decimal Equiv of Sixty fourths etc.
8-0	.....	.....	.....	.....	.....	.....	This gauge	.0083	....	8-0	1/64	.0156
7-0	.....	.....	.....	.....	.500	.....	from one to	.0087	....	7-0	1/32	.03125
6-0	.....	.....	.....	.464	.469	.....	three thous-	.0095	....	6-0	1/16	.625
5-0	.....	.....	.....	.432	.438	.....	andths larger	.010	....	5-0	5/64	.07813
4-0	.460	.454	.394	.400	.406	.....	than same Nos.	.011	....	4-0	3/32	.09375
3-0	.410	.425	.363	.372	.375	.....	of Stubbs steel	.012	.032	3-0	7/64	.10938
2-0	.365	.380	.331	.348	.344	.....	wire gauge	.013	.045	2-0	1/8	.125
0	.325	.340	.307	.334	.313	.....		.014	.058	0	9/64	.14063
1	.289	.300	.283	.300	.281	.277	.228	.016	.071	1	5/32	.15625
2	.258	.284	.263	.276	.266	.219	.221	.017	.084	2	11/64	.17188
3	.229	.259	.244	.252	.250	.212	.213	.018	.097	3	3/16	.1875
4	.204	.238	.225	.232	.234	207	.209	.019	.110	4	13/64	.20313
5	.182	.220	.207	.212	.219	.204	.206	.020	.124	5	7/32	.21875
6	.162	.203	.192	.192	.203	.201	.204	.022	.137	6	15/64	.23438
7	.144	.180	.177	.176	.188	.199	.201	.023	.150	7	1/4	.25
8	.128	.165	.162	.160	.172	.197	.199	.024	.163	8	17/64	.26563
9	.114	.148	.148	.144	.156	.194	.196	.026	.176	9	9/32	.28125
10	.102	.134	.135	.128	.141	.191	.194	.027	.189	10	19/64	.29688
11	.091	.120	.121	.116	.125	.188	.191	.028	.203	11	5/16	.3125
12	.081	.109	.106	.104	.109	.185	.189	.030	.216	12	21/64	.32813
13	.072	.095	.092	.092	.094	.182	.185	.031	.229	13	11/32	.34375
14	.064	.083	.080	.080	.078	.180	.182	.033	.242	14	23/64	.35938
15	.057	.072	.072	.072	.070	.178	.180	.035	.255	15	3/8	.375
16	.051	.065	.063	.064	.063	.175	.177	.036	.268	16	25/64	.39063
17	.045	.058	.054	.056	.056	.172	.173	.038	.282	17	13/32	.40625
18	.040	.049	.048	.048	.050	.168	.170	.040	.295	18	27/64	.42188
19	.036	.042	.041	.040	.044	.164	.166	.041	.308	19	7/16	.4375
20	.032	.035	.035	.036	.038	.161	.161	.043	.321	20	29/64	.45313
21	.028	.032	.032	.032	.034	.157	.159	.046	.334	21	15/32	.46875
22	.025	.028	.029	.028	.031	.155	.157	.048	.347	22	31/64	.48438
23	.023	.025	.026	.024	.028	.153	.154	.051	.360	23	1/2	.5
24	.020	.022	.023	.022	.025	.151	.152	.055	.374	24	33/64	.51563
25	.018	.020	.020	.020	.022	.148	.150	.059	.387	25	17/32	.53125
26	.016	.018	.018	.018	.019	.146	.147	.063	.400	26	35/64	.54688
27	.0141	.016	.0173	.0164	.0171	.143	.144	.066	.413	27	9/16	.5625
28	.0126	.014	.0162	.0149	.0156	.139	.141	.072	.426	28	37/64	.57813
29	.0112	.013	.015	.0136	.014	.134	.136	.076	.439	29	19/32	.59375
30	.010	.012	.014	.0124	.0125	.127	.129	.080	.453	30	39/64	.60938
31	.0089	.010	.0132	.0116	.0109	.120	.120	....	.466	31	5/8	.625
32	.0079	.009	.0128	0108	.0101	.115	.116	....	.479	32	41/64	.64063
33	.007	.008	.0118	.010	.0093	.112	.113	....	.492	33	21/32	.65625
34	.0063	.007	.0104	.0092	.0085	.110	.111	....	.505	34	43/64	.67188
35	.0056	.005	.0095	.0084	.0078	.108	.110	....	.518	35	11/16	.6875
36	005	.004	.009	.0076	.007	.106	.1065	....	.532	36	45/64	.70313
37	.0044	.....	.....	.0068	.0066	.103	.104	....	.545	37	23/32	.71875
38	.0039	.....	.....	.006	.0062	.101	.1015	....	.558	38	47/64	.73438
39	.0035	.....	.....	.0052	.....	.099	.0995	....	.571	39	3/4	.75
40	.0031	.....	.....	.0048	.....	.097	.098	....	.584	40	49/64	.76563
41	.....	.....	.....	.....	.....	.095	.096	....	.597	41	25/32	.78125
42	.....	.....	.....	.....	.....	.092	.094	....	.611	42	51/64	.79688
43	.....	.....	.....	.....	.....	.088	.089	....	.624	43	13/16	.8125
44	.....	.....	.....	.....	.....	.085	.086	....	.637	44	53/64	.82813
45	.....	.....	.....	.....	.....	.081	.082	....	.650	45	27/32	.84375
46	.....	.....	.....	.....	.....	.079	.081	....	.663	46	55/64	.85938
47	.....	.....	.....	.....	.....	.077	.079	....	.676	47	7/8	.875
48	.....	.....	.....	.....	.....	.075	.076	....	.690	48	57/64	.89063
49	.....	.....	.....	.....	.....	.072	.073	....	.703	49	29/32	.90625
50	.....	.....	.....	.....	.....	.069	.070	....	.716	50	59/64	.92188

Letter Sizes Stubbs Steel Wire

A	.234	I	.272	R	.339
B	.238	J	.277	S	.348
C	.242	K	.281	T	.358
D	.246	L	.290	U	.368
E	.250	M	.295	V	.377
F	.257	N	.302	W	.386
G	.261	O	.316	X	.397
H	.266	P	.323	Y	.404
		Q	.332	Z	.413

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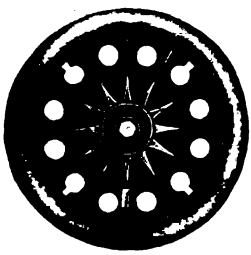
Phineas Jones & Co.

Newark, New Jersey

Make the best Automobile wheels. Only one quality—the **best.**

Fifty years at vehicle wheel making.



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O. K. them in every way. Write us for information.

INDESTRUCTIBLE STEEL WHEEL CO.

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Pat. Sept., '08.

THE IDEAL AUTOMOBILE TIRE

Is the PNEUMATIC TIRE with the

Brameld Non-Collapsible Inner Tube

These tubes are designed to carry the loaded car when the tires become deflated by punctures or other causes, entirely doing away with all repair work on tires while on the road. No change whatever required in present equipment; simply pull out the collapsing tube and insert **The Brameld** Non-Collapsing Tube in the old casing; and the tire is good until the last layer of fabric is worn through. No stopping—No delays—No worry—Keep a-going. Your tires at all times in running condition—inflated or deflated. Write to-day for price list.

The Brameld Non-Collapsible Pneumatic Tire Co.

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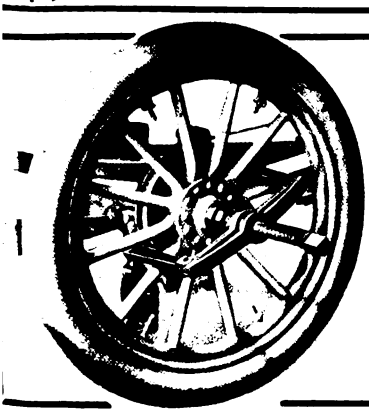

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CRANE WHEEL PULLER

FOR REMOVING AUTOMOBILE WHEELS

Easily and Quickly Takes Off Wheels Without Damage.

Indispensable in the Garage, Machine Shop, or to the Automobile owner.

Automobile Size $8.40 Machine Shop Size $9.00

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Send for catalogue.

"CRANE PULLER,"

14 Exchange Place, BOSTON, MASS.

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SIZES OF NUMBERS OF THE UNITED STATES STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL

AN ACT ESTABLISHING A STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That for the purpose of securing uniformity the following is established as the only gauge for sheet and plate iron and steel in the United States of America, namely:

NUMBER OF GAUGE	Approximate Thickness in Fractions of an Inch	Approximate Thickness in Decimal Parts of an Inch	Weight per Square Foot in Ounces Avoirdupois	Weight per Square Foot in Pounds Avoirdupois
0000000	1/2	.5	320	20.00
000000	15/32	.46875	300	18.75
00000	7/16	.4375	280	17.50
0000	13/32	.40625	260	16.25
000	3/8	.375	240	15.00
00	11/32	.34375	220	13.75
0	5/16	.3125	200	12.50
1	9/32	.28125	180	11.25
2	17/64	.265625	170	10.625
3	1/4	.25	160	10.00
4	15/64	.234375	150	9.375
5	7/32	.21875	140	8.75
6	13/64	.203125	130	8.125
7	3/16	.1875	120	7.5
8	11/64	.171875	110	6.875
9	5/32	.15625	100	6.25
10	9/64	.140625	90	5.625
11	1/8	.125	80	5.00
12	7/64	.109375	70	4.375
13	3/32	.09375	60	3.75
14	5/64	.078125	50	3.125
15	9/128	.0703125	45	2.8125
16	1/16	.0625	40	2.5
17	9/160	.05625	36	2.25
18	1/20	.05	32	2.
19	7/160	.04375	28	1.75
20	3/80	.0375	24	1.50
21	11/320	.034375	22	1.375
22	1/32	.03125	20	1.25
23	9/320	.028125	18	1.25
24	1/40	.025	16	1.
25	7/320	.021875	14	.875
26	3/160	.01875	12	.75
27	11/640	.0171875	11	.6875
28	1/64	.015625	10	.625
29	9/640	.0140625	9	.5625
30	1/80	.0125	8	.5
31	7/640	.0109375	7	.4375
32	13/1280	.01015625	6½	.40625
33	3/320	.009375	6	.375
34	11/1280	.00859375	5½	.34375
35	5/640	.0078125	5	.3125
36	9/1280	.00703125	4½	.28125
37	17/2560	.006640625	4¼	.265625
38	1/160	.00625	4	.25

And on and after July first, eighteen hundred and ninety-three, the same and no other shall be used in determining duties and taxes levied by the United States of America on sheet and plate iron and steel. But this act shall not be construed to increase duties upon any articles which may be imported.

SEC. 3.—That in the practical use and application of the standard gauge hereby established a variation of two and one-half per cent. either way may be allowed.

Approved March 3, 1893.

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We sell to the

Largest Commercial Truck Companies

Largest Pleasure Vehicle Companies

Largest Users of Electric Storage Batteries

in the world.

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Philadelphia Storage Battery Co.
Office, 3520 Emerald Street
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Buy The Best

The Combat Igniter

(Automobile Sparking Battery)

6 volt Combat "Special" (60 Amperes)
Good for 1500 miles (per charge) **$17.50**

6 volt Combat "Powerful" (80 Amperes)
Good for 2500 miles (per charge) **$22.50**

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SPARK PLUGS

IGNITION ABSOLUTELY SURE

RAJAH AUTO SUPPLY COMPANY BLOOMFIELD, NEW JERSEY
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THE MICHIGAN IGNITER

The solid construction of the **Michigan Igniter** gives it perfect reliability under the most trying circumstances. For gasoline motor ignition it is unequalled. It is impossible for us to tell you all its good points in this space. Write for Catalog B—it's useful and free.

Michigan Storage Battery Co., Detroit, Mich.

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WEIGHTS OF METALS

	Lbs. per Cu. Ft.	Lbs. per Cu. In.
Aluminum, cast	160.	.0926
Brass, cast	506.3	.293
Brass, sheet	528	.3056
Babbitt metal	440.6	.255
Bronze, aluminum	471.2	.2727
Bronze, phosphor	575.8	.3332
Copper wire	555.1	.3212
Cast iron	450.	.2604
Wrought iron, bars	486.8	.2817
Steel, Bessemer	490.7	.284
Lead, cast	709.5	.4106
Nickel	548.7	.3175
Tin	458.3	.2652
Zinc	436.5	.2526

PROPORTIONATE WEIGHT OF CASTINGS TO WEIGHT OF WOOD PATTERNS

A Pattern Weighing One Pound, Made of (Less Weight of Core Prints)	Cast Iron	Brass	Copper	Bronze	Bell Metal	Zinc
Pine or Fir	16	15.8	16.7	16.3	17.1	13.5
Oak	9	10.1	10.4	10.3	10.9	8.6
Beech	9.7	10.9	11.4	11.3	11.9	9.1
Linden	13.4	15.1	16.7	15.5	16.3	12.9
Pear	10.2	11.5	11.9	11.8	12.4	9.8
Birch	10.6	11.9	12.3	12.2	12.9	10.2
Alder	12.8	14.3	14.9	14.7	15.5	12.2
Mahogany	11.7	13.2	13.7	13.5	14.2	11.2
Brass	0.85	0.95	0.99	0.98	1.0	0.81

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VANADIUM CRUCIBLE STEEL CASTINGS FOR Automobiles

WE ALSO MAKE CHROME, NICKEL AND MANGANESE STEEL

Chicago Steel Foundry Co., CHICAGO, ILL. U. S. A.

NON-GRAN
TRADE MARK

A MANUFACTURER, in order to deliver good goods, must put good goods into his goods. In manufacturing a machine of any kind where are good goods of more importance than in the BEARINGS—the parts that take the wear? We buy only good goods. (Prime Lake Copper for example.) We deliver only good goods. NON-GRAN BEARING BRONZE. How about that "American Thomas?" It's sliding on NON-GRAN and it's good goods. Write for our Automatic Price Sheet. Try some real good goods.

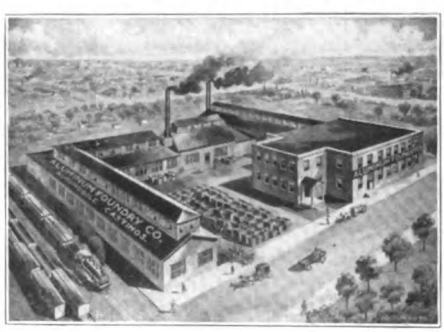
AMERICAN BRONZE COMPANY, Berwyn, Pa., U. S. A

Manganese Bronze and Brass Castings

Machine work and Polishing and Plating, Patterns and Tools.
Made in a strictly high-grade way from the best of material and by the best of workmen for those who are very particular as to castings, and all at a price that is quite low, quality considered. We also do sheet metal stampings and spinnings, high grade work. Let's get acquainted. 'Twill be to our mutual good. Ask for prices on something, to-day.

The Fowler Brass Works
2333-2335 Wabash Avenue
CHICAGO, ILL.

WE MANUFACTURE



ALUMINUM CASTINGS ONLY

WRITE US FOR PARTICULARS

ALUMINUM FOUNDRY COMPANY Manitowoc, Wis.

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WEIGHT IN POUNDS OF A LINEAL FOOT OF ROUND, SQUARE AND OCTAGON STEEL

Size in Inches	Round	Octagon	Square	Size in Inches	Round	Octagon	Square
1/16	.010	.011	.013	2 1/2	16.79	17.71	21.37
1/8	.042	.044	.053	2 5/8	18.51	19.52	23.56
3/16	.094	.099	.120	2 3/4	20.31	21.42	25.86
1/4	.168	.177	.214	2 7/8	22.20	23.41	28.27
5/16	.262	.277	.334	3	24.17	25.50	30.78
3/8	.378	.398	.491	3 1/8	26.23	27.66	33.40
7/16	.514	.542	.655	3 1/4	28.37	29.92	36.12
1/2	.671	.708	.855	3 3/8	30.59	32.27	38.95
9/16	.850	.896	1.082	3 1/2	32.90	34.70	41.89
5/8	1.049	1.107	1.336	3 5/8	35.29	37.23	44.94
11/16	1.270	1.339	1.616	3 3/4	37.77	39.84	48.09
3/4	1.511	1.594	1.924	3 7/8	40.33	42.54	51.35
13/16	1.773	1.870	2.258	4	42.97	45.33	54.72
7/8	2.056	2.169	2.618	4 1/4	48.51	51.17	61.77
15/16	2.361	2.490	3.006	4 1/2	54.39	57.37	69.25
1	2.686	2.833	3.420	4 3/4	60.60	63.92	77.16
1 1/8	3.399	3.585	4.328	5	67.15	70.83	85.50
1 1/4	4.197	4.427	5.344	5 1/4	74.03	78.08	94.26
1 3/8	5.078	5.356	6.466	5 1/2	81.25	85.70	103.45
1 1/2	6.044	6.374	7.695	5 3/4	88.80	93.67	113.07
1 5/8	7.093	7.481	9.031	6	96.69	101.99	123.12
1 3/4	8.226	8.674	10.474	7	131.61	138.82	167.58
1 7/8	9.443	9.960	12.023	8	171.90	181.32	218.88
2	10.744	11.332	13.680	9	217.57	229.48	277.02
2 1/8	12.129	12.793	15.443	10	268.60	283.31	342.00
2 1/4	13.598	14.343	17.314	11	325.01	342.80	413.82
2 3/8	15.151	15.981	19.291	12	386.79	407.97	492.48

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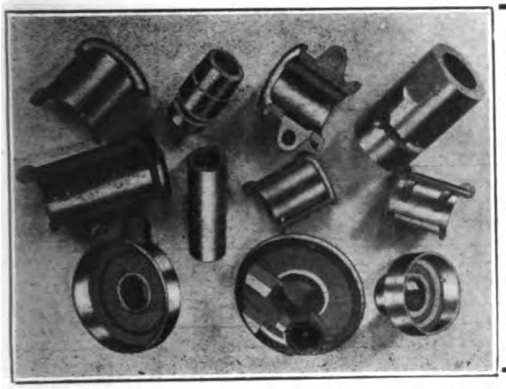

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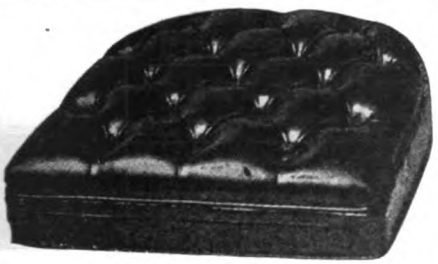

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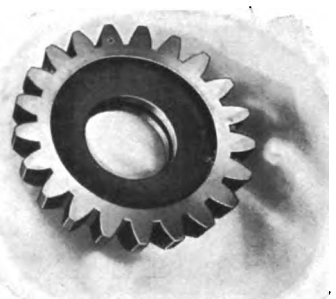

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WEIGHT OF STEEL PER LINEAL FOOT

FLAT SIZES

	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/2	4	5	6	7
1/8	.213	.266	.320	.372	.426	.479	.530	.585	.640	.745	.850	.955	1.07	1.18	1.28	1.49	1.70	2.13	2.56	2.98
3/16	.319	.399	.480	.558	.639	.718	.790	.878	.960	1.12	1.28	1.43	1.60	1.76	1.92	2.24	2.55	3.20	3.83	4.47
1/4	.425	.533	.640	.743	.852	.958	1.06	1.17	1.28	1.49	1.70	1.91	2.13	2.34	2.56	2.98	3.40	4.26	5.11	5.96
5/16	.531	.665	.800	.929	1.06	1.20	1.33	1.46	1.60	1.86	2.13	2.39	2.66	2.92	3.19	3.72	4.25	5.32	6.38	7.44
3/8	.638	.798	.960	1.12	1.28	1.43	1.59	1.75	1.91	2.23	2.55	2.87	3.20	3.51	3.83	4.46	5.10	6.40	7.66	8.92
7/16	.744	.931	1.12	1.30	1.49	1.67	1.86	2.05	2.23	2.60	2.98	3.35	3.72	4.09	4.46	5.21	5.95	7.44	8.92	10.40
1/2	.....	1.07	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.98	3.40	3.83	4.26	4.68	5.10	5.96	6.80	8.52	10.20	11.90
9/16	.....	1.20	1.44	1.67	1.91	2.15	2.39	2.63	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.69	7.65	9.56	11.50	13.40
5/8	.....	.....	1.60	1.86	2.12	2.39	2.66	2.92	3.19	3.72	4.26	4.79	5.32	5.86	6.39	7.44	8.52	10.64	12.78	14.90
11/16	.....	.....	1.76	2.04	2.34	2.63	2.92	3.22	3.51	4.09	4.68	5.26	5.84	6.43	7.01	8.18	9.35	11.70	14.00	16.40
3/4	.....	.....	.....	2.23	2.55	2.86	3.19	3.50	3.83	4.46	5.10	5.74	6.40	7.02	7.65	8.92	10.20	12.80	15.30	17.90
13/16	.....	.....	.....	2.41	2.76	3.11	3.45	3.80	4.14	4.83	5.53	6.22	6.91	7.60	8.29	9.67	11.10	13.80	16.60	19.30
7/8	.....	.....	.....	.....	2.98	3.34	3.72	4.09	4.46	5.21	5.96	6.70	7.46	8.19	8.94	10.42	11.92	14.87	17.88	20.80
15/16	.....	.....	.....	.....	3.19	3.59	3.98	4.38	4.78	5.58	6.38	7.17	7.97	8.77	9.56	11.20	12.80	15.90	19.10	22.40
1	.....	.....	.....	.....	.....	3.82	4.25	4.68	5.10	5.96	6.80	7.66	8.52	9.36	10.20	11.92	13.60	17.04	20.40	23.80
1 1/8	.....	.....	.....	.....	.....	.....	4.78	5.27	5.74	6.71	7.65	8.61	9.59	10.54	11.48	13.41	15.30	19.17	22.95	26.80
1 1/4	.....	.....	.....	.....	.....	.....	.....	5.85	6.38	7.45	8.50	9.57	10.65	11.71	12.76	14.90	17.00	21.30	25.61	29.76
1 1/2	.....	.....	.....	.....	.....	.....	.....	7.02	7.67	8.94	10.20	11.49	12.78	14.04	15.30	17.88	20.40	25.56	30.60	35.70

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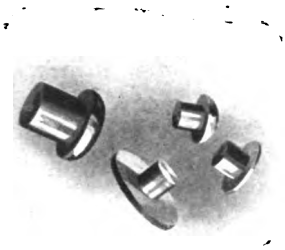

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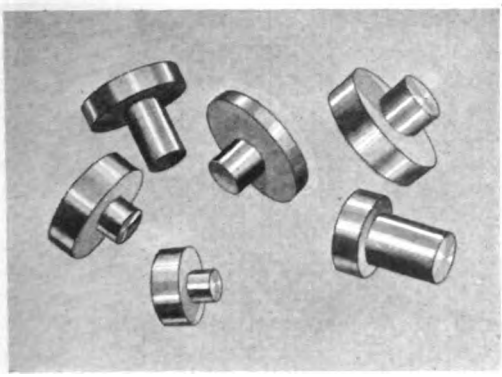

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We make gas lamps too, and they are rather better than most others. Ask us about these, also. We make exclusive designs for car builders, and we have a repair department for the regeneration of busted lamps. You'd do well to get in touch with us. It'll be worth while—and don't forget to ask us about The Fowler Lamp Lighter when you write.

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WEIGHT IN POUNDS OF SHEET AND BAR ALUMINUM, BRASS AND STEEL

Thickness or Diam. in Inch		Sheets per Square Foot			Square Bars, One Foot Long			Round Bars, One Foot Long		
Fraction	Dec.	Alum.	Brass	Steel	Alum.	Brass	Steel	Alum.	Brass	Steel
1/16	.0625	.869	2.77	2.52	.004	.014	.013	.003	.011	.010
1/8	.125	1.739	5.55	5.10	.018	.057	.053	.014	.047	.042
3/16	.1875	2.609	8.32	7.65	.041	.131	.119	.032	.102	.094
1/4	.2500	3.479	11.10	10.20	.072	.230	.212	.057	.182	.167
5/16	.3125	4.348	13.87	12.75	.114	.380	.333	.089	.284	.261
3/8	.3750	5.218	16.64	15.30	.163	.520	.478	.128	.408	.375
7/16	.4375	6.088	19.42	17.85	.222	.708	.651	.174	.555	.511
1/2	.5000	6.958	22.20	20.40	.290	.925	.850	.227	.724	.667
9/16	.5625	7.827	24.97	22.95	.367	1.171	1.076	.288	.919	.845
5/8	.6250	8.697	27.74	25.50	.453	1.445	1.328	.356	1.136	1.043
11/16	.6875	9.567	30.52	28.05	.548	1.748	1.608	.430	1.372	1.262
3/4	.7500	10.436	33.29	30.60	.652	2.080	1.913	.516	1.646	1.502
13/16	.8125	11.306	36.07	33.15	.766	2.445	2.245	.601	1.917	1.763
7/8	.8750	12.175	38.84	35.70	.888	2.833	2.603	.697	2.223	2.044
15/16	.9375	13.045	41.61	38.25	1.019	3.251	2.989	.800	2.552	2.347
1	1.0000	13.915	44.39	40.80	1.159	3.697	3.400	.911	2.906	2.670
1 1/16	1.0625	14.784	47.16	43.35	1.309	4.176	3.838	1.028	3.279	3.014
1 1/8	1.125	15.654	49.94	45.90	1.467	4.630	4.303	1.152	3.675	3.379
1 3/16	1.1875	16.524	52.71	48.45	1.635	5.216	4.795	1.284	4.096	3.766
1 1/4	1.2500	17.394	55.48	51.00	1.812	5.780	5.312	1.423	4.539	4.173
1 5/16	1.3125	18.263	58.26	53.55	1.997	6.370	5.857	1.569	5.003	4.600
1 3/8	1.3750	19.133	61.04	56.10	2.192	6.692	6.428	1.722	5.491	5.049
1 7/16	1.4375	20.002	63.81	58.65	2.396	7.644	7.026	1.882	6.002	5.518
1 1/2	1.5000	20.872	66.58	61.20	2.609	8.322	7.650	2.049	6.536	6.008
1 9/16	1.5625	21.741	69.35	63.75	2.831	9.030	8.301	2.223	7.091	6.520
1 5/8	1.6250	22.611	72.13	66.30	3.062	9.768	8.978	2.405	7.672	7.051
1 11/16	1.6875	23.481	74.90	68.85	3.302	10.53	9.682	2.593	8.271	7.604
1 3/4	1.7500	24.350	77.67	71.40	3.550	11.32	10.41	2.789	8.896	8.178
1 13/16	1.8125	25.250	80.54	73.95	3.810	12.15	11.17	2.992	9.544	8.773
1 7/8	1.8750	26.090	83.22	76.50	4.075	13.00	11.95	3.202	10.21	9.388
1 15/16	1.9375	26.960	86.00	79.05	4.352	13.88	12.76	3.417	10.90	10.02
2	2.0000	27.829	88.77	81.60	4.638	14.79	13.60	3.642	11.62	10.68

WEIGHT OF ALUMINUM, IRON, COPPER, BRASS AND LEAD BALLS

Dia. In.	Alum., Lbs.	Iron, Lbs.	Copper, Lbs.	Brass, Lbs.	Lead, Lbs.	Dia., In.	Alum, Lbs.	Iron, Lbs.	Copper Lbs.	Brass, Lbs.	Lead, Lbs.
1	.045	.136	.166	.158	.214	7	15.58	46.76	57.1	54.5	73.7
1½	.153	.46	.562	.537	.727	7½	19.17	57.52	70.0	67.11	90.0
2	.363	1.09	1.3	1.25	1.7	8	23.27	69.81	85.2	81.4	110.1
2½	.710	2.13	2.60	2.50	3.35	8½	27.91	83.73	102.3	100.0	132.3
3	1.22	3.68	4.5	4.3	5.8	9	33.10	99.4	121.3	115.9	156.7
3½	1.94	5.84	7.14	6.82	9.23	9½	38.90	116.9	143.0	136.4	184.7
4	2.90	8.72	10.7	10.2	13.8	10	45.45	136.35	166.4	159.0	215.0
4½	3.13	12.42	15.25	14.5	19.6	10½	52.60	157.84	193.0	184.0	250.0
5	5.68	17.04	20.8	19.9	26.9	11	60.49	181.48	221.8	211.8	286.7
5½	7.56	22.68	27.74	26.47	36.0	11½	69.12	207.37	253.5	242.0	327.7
6	9.81	29.45	35.9	34.3	46.4	12	78.54	235.62	288.1	275.0	372.3
6½	12.48	37.44	45.76	43.67	59.13						

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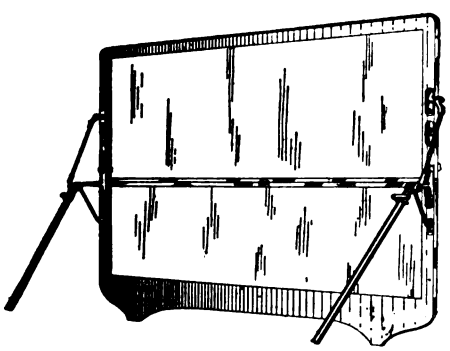

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STRENGTH OF AUTOMOBILE MATERIALS

	Modulus of Rigidity	Elastic Limit	Tensile Strength
Aluminum alloys	8 to 11 million	10 M to 15 M	20 M to 30 M
Phosphor bronze	12 to 14 "	20,000	30,000
Manganese bronze	15 "	35,000	50,000
Aluminum bronze	15 "	50,000	75,000
Wrought iron	28 "	30,000	40,000
Mild open hearth steel	28 "	40 000	60,000
Tool steel	29 "	80,000	110,000
Nickel steel	28 "	80,000	110,000
Nickel chrome steel	30 "	160,000	180,000
Vanadium steel treated	30 "	220,000	228,000

All of the above materials stand well under dynamic stress with the exception of the tool steel, which should not be used for this purpose.

TEST OF HIGH QUALITY NICKEL CHROME STEEL (KRUPP)

DIMENSIONS OF TEST BARS, 5.91 INS. LONG AND 0.59 INS. DIAMETER

	Normal	Slightly Hardened	Greater Degree of Hardness
Elastic limit, pounds per square inch	86,909	148,072	193,589
Tensile strength, pounds per square inch	111,943	155,326	221,325
Elongation, per cent	14.5	9.1	7.7
Contraction, per cent	64.0	55.6	46.2

Foregoing tests assume correct heat treatment.

MELTING POINTS OF METALS

Cast iron	2210	deg. Fahr.
Wrought iron	2912	" "
Steel	2500	" "
Copper	2160	" "
Brass	1900	" "
Aluminum (pure)	1112	" "
Lead	608	" "
Tin	446	" "

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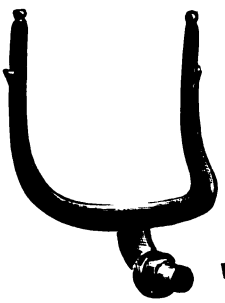

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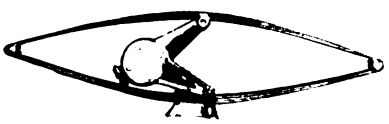

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The scientific principle, on which the "Shocsorber" is constructed, is such that the downward or closing action of the springs is not retarded in the least, but the rebound, which is so disastrous to spring leaves, is checked, and the springs are allowed to open slowly.

In this way not only is the life of the tires increased, as well as the springs saved from breakage, but also the passenger in the tonneau has easy, comfortable riding.

Manufacturers—As a part of the equipment of your cars, the "Shocsorber" will add very considerably to their selling power without adding materially to the cost *Agents wanted everywhere.*

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New York Office: Jarman & Baker, 1779 Broadway

Chicago Office: Fulton & Zinke, 1256 Michigan Ave.

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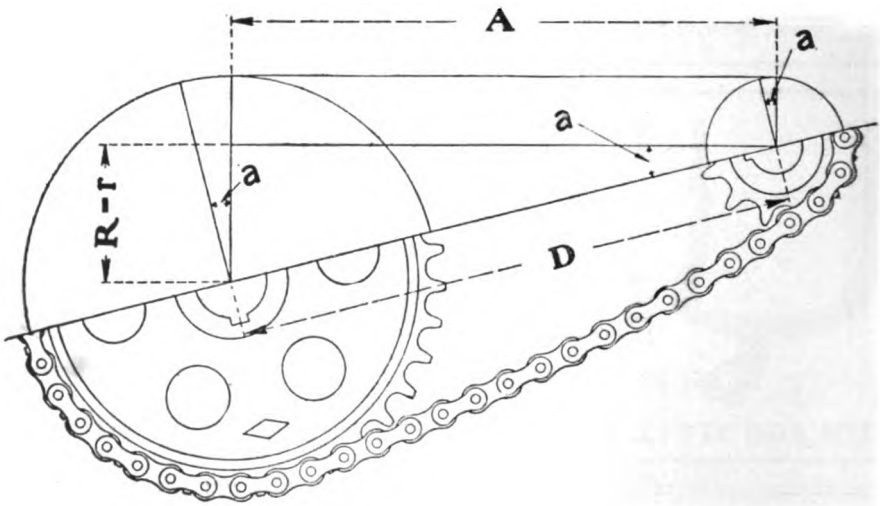
FORMULA FOR CALCULATING LENGTH OF CHAIN

(DIAMOND CHAIN AND MFG. CO.)



(All Dimensions in Inches)

D = Distance between centers.
A = Distance between limits of contact.
R = Pitch radius of large sprocket.
r = Pitch radius of small sprocket.
N = No. of teeth on large sprocket.
n = No. of teeth on small sprocket.
P = Pitch of chain and sprockets.
$180° \div 2\alpha$ = Angle of contact—large sprocket.
$180° \div 2\alpha$ = Angle of contact—small sprocket.

$$\alpha = Sin^{-1} \frac{R - r}{D}$$

$$A = D \; Cos \; \alpha$$

Total length of chain.

$$L = \frac{180 \div 2\alpha}{360} N P \div \frac{180 - 2\alpha}{360} n P + 2D \, Cos \, \alpha$$

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Automobile
Oils and Greases
"Atlas" Brand

SWAN & FINCH COMPANY

JAMES C. PEABODY, Pres't.

151 MAIDEN LANE Established 1853 NEW YORK

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FORMULA FOR DETERMINING DIAMETERS OF SPROCKETS FOR ROLLER CHAINS

(WHITNEY MFG. CO.)

N = Number of teeth in sprocket.
P = Pitch of chain.
D = Diameter of roller.

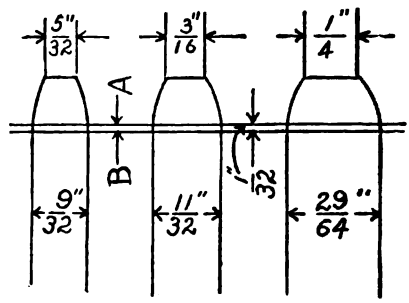
$$a = \frac{180^\circ}{N}$$

$$\text{Pitch Diameter} = \frac{P}{\text{sine } a}$$

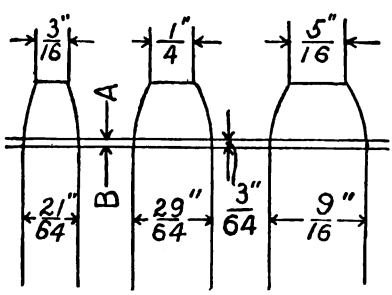
Outside Diameter = Pitch Diameter + D.
Bottom Diameter = Pitch Diameter − D.

The accompanying drawings show width and shape of sprocket blanks as they should be machined before cutting the teeth to fit (Whitney) chains.

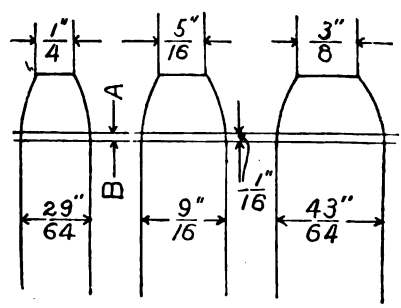
The line "A" indicates pitch line and the line "B" below the pitch line indicates the point at which the clearance curves should start.



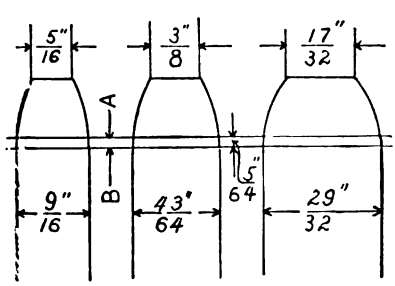
	Pitch of Chain.	
3/4"	3/4"	3/4"
	Diameter of Roll.	
15/32"	15/32"	15/32"
	Width of Roll.	
5/16"	3/8"	1/2"



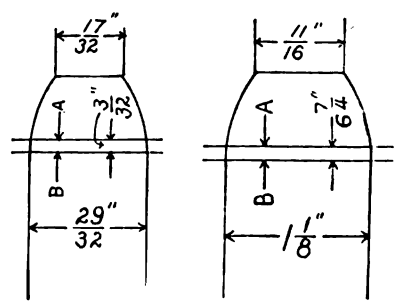
	Pitch of Chain.	
1"	1	1"
	Diameter of Roll.	
5/8"	5/8"	5/8"
	Width of Roll.	
3/8"	1/2"	5/8"



	Pitch of Chain.	
1 1/4"	1 1/4"	1 1/4"
	Diameter of Roll.	
3/4"	3/4"	3/4"
	Width of Roll.	
1/2"	5/8"	3/4"



	Pitch of Chain.	
1 1/2"	1 1/2"	1 1/2"
	Diameter of Roll.	
7/8"	7/8"	7/8"
	Width of Roll.	
5/8"	3/4"	1"



	Pitch of Chain.	
1 3/4"		2"
	Diameter of Roll.	
1"		1 1/8"
	Width of Roll.	
1"		1 1/4

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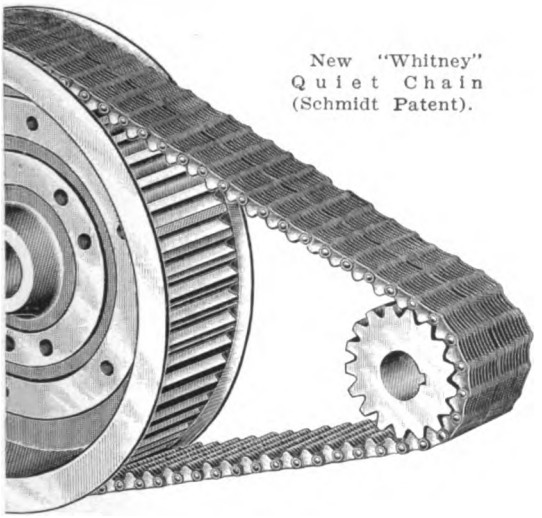
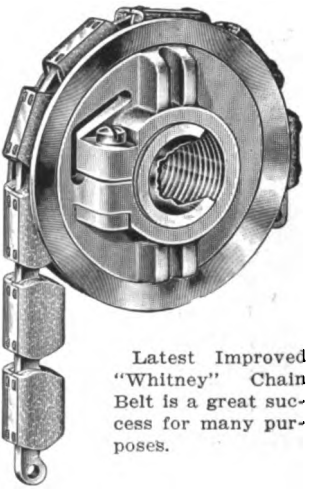
PATENTED



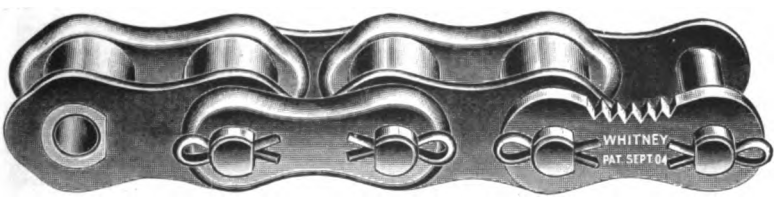
New "Whitney" Quiet Chain (Schmidt Patent).

PATENTED

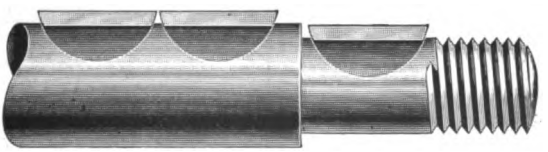


Latest Improved "Whitney" Chain Belt is a great success for many purposes.

PATENTED



"Whitney" 1909 Model Roller Chains for Automobiles, etc., are far superior to chains of the past. At present a "Whitney" 1" Pitch Chain is stronger than earlier model chains 1½" pitch, which shows a tremendous gain in efficiency and a great improvement for smooth, quiet running. "Whitney" Standards for dimensions of Roller Chains have been adopted by nearly all American Motor Car Manufacturers.



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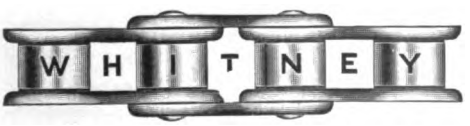

New Chain for Motorcycles, etc.

The Whitney Mfg. Co.

Hartford, Conn.

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AUTOMOBILE WHEEL DATA

The following information is approximately correct, but the weights, etc., may vary according to the height of wheels, etc.:

WEIGHT OF WHEELS PER SET OF FOUR

Weight of wheels and hubs without rims or channels, size of spoke $\frac{7}{8}$ to 1″ or $1\frac{1}{8}$″, about	50	pounds
" same size with steel rims for $2\frac{1}{2}$″ or 3″ tire	110	"
" 1″ or $1\frac{1}{8}$″ spokes	65	"
" including rims for 3″ or $3\frac{1}{2}$″ tires	145	"
" $1\frac{1}{4}$″ or $1\frac{3}{8}$″ spokes	100	"
" including rims for $3\frac{1}{2}$″ or 4″ tire	210	"
" $1\frac{3}{8}$″ or $1\frac{1}{2}$″ spokes	112	"
" including rims for 4″ or $4\frac{1}{2}$″ tire	250	"

Axles are not included in above.

METRIC TIRES AND THEIR AMERICAN EQUIVALENTS

Metric Sizes	Approximate Size in Inches
650 x 65	26 x 2 1/2
700 x 65	28 x 2 1/2
750 x 65	30 x 2 1/2
800 x 65	32 x 2 1/2
830 x 65	33 x 2 1/2
860 x 65	34 x 2 1/2
700 x 85	28 x 3 1/4
750 x 85	30 x 3 1/4
800 x 85	32 x 3 1/4
860 x 85	34 x 3 1/4
760 x 90	30 x 3 1/2
810 x 90	32 x 3 1/2
840 x 90	32 x 3 1/2
870 x 90	34 x 3 1/2
910 x 90	36 x 3 1/2
960 x 90	38 x 3 1/2
1010 x 90	40 x 3 1/2
815 x 105	32 x 4
875 x 105	34 x 4
915 x 105	36 x 4
820 x 120	32 x 4 1/2-5
850 x 120	33 x 4 1/2-5
880 x 120	34 x 4 1/2-5
920 x 120	36 x 4 1/2-5
1020 x 120	40 x 4 1/2-5
1080 x 120	42 x 4 1/2-5

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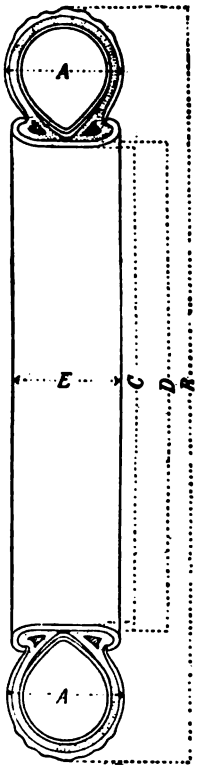
CLINCHER TIRE AND RIM DIMENSIONS



A Inches	B Inches	C Inches	D Inches	E Inches
2 1/2	26	18 3/4	19	1 3/8
3	26	19 3/4	20	1 3/8
2 1/2 and 3	28	21 3/4	22	1 3/8
2 1/2 and 3	30	23 3/4	24	1 3/8
3	32	25 3/4	26	1 3/8
3	34	27 3/4	28	1 3/8
3	36	29 3/4	30	1 3/8
3 1/2	28	20 11/16	21	1 3/8
3 1/2	30	22 11/16	23	1 1/2
3 1/2	32	24 11/16	25	1 1/2
3 1/2	34	26 11/16	27	1 1/2
3 1/2	36	28 11/16	29	1 1/2
4	30	21 11/16	22	2
4	32	23 11/16	24	2
4	34	25 11/16	26	2
4	36	27 11/16	28	2
4 1/2	32	22 11/16	23	2 1/4
4 1/2	34	24 11/16	25	2 1/4
4 1/2	36	26 11/16	27	2 1/4

PROPORTIONS BETWEEN AXLE LOADS AND TIRE SIZES ADOPTED BY AMERICAN TIRE MAKERS

3 1/2-inch tires, all diameters	225	pounds per wheel
2- inch tires, all diameters	350	" " "
3 1/2 x 28-inch tires	400	" " "
3 1/2 x 30-inch tires	450	" " "
3 1/2 x 32-inch tires	555	" " "
3 1/2 x 34-inch tires	600	" " "
3 1/2 x 36-inch tires	600	" " "
4 x 30-inch tires	550	" " "
4 x 32-inch tires	650	" " "
4 x 34-inch tires	700	" " "
4 x 36-inch tires	750	" " "
4 1/2 x 32-inch tires	700	" " "
4 1/2 x 34-inch tires	800	" " "
4 1/2 x 36-inch tires	900	" " "

For weights in excess of 1,000 pounds per wheel, 5-inch tires and over are recommended. Weights given apply to car without passengers.

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filled gears can be run in oil, or without oil, and absolutely hold their shape.

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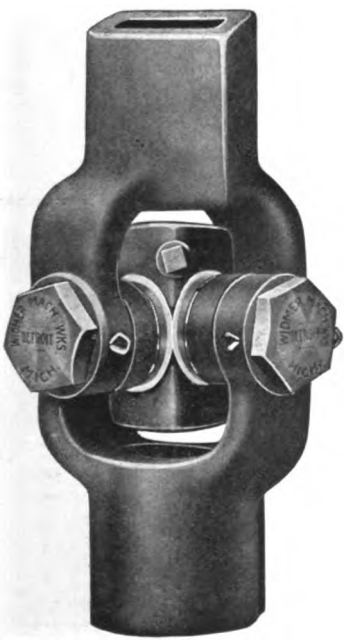
We also make metal gears.



Our **UNIVERSAL JOINTS** are absolutely dust proof and self-lubricating, well designed and balanced, of suitable material and best workmanship so as to secure absolute satisfaction—so much so, it recommends itself to you as especially adapted for heavy duty and constant tortional service. The cross is hollow, forming an oil reservoir large enough in area to contain enough **LUBRICANT** (oil or grease) for a season, as the joint will centrifically oil itself.

These joints are made in sizes No. 1 for 15 H. P. or less. No. 2 will stand up to 35 H.P.

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DETROIT, MICHIGAN

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AIR PRESSURES FOR INFLATING PNEUMATIC TIRES RECOMMENDED BY LEADING MAKERS

Diameter of Tire, Inches	Maximum Weight on Wheel, lbs.	Air Pressure in Tire, lbs. per Square Inch
2 1/2	225	50
3	350	60
3 1/2	600	70
4	750	80
4 1/2	1,000	90
5	1.000	90

INCREASE IN AIR PRESSURES CAUSED BY DRIVING

The figures given by tire manufacturers as the most suitable for initial inflation generally take into account the increase in temperature and pressure created by prolonged running. It, however, is useful to know what this increase is. The figures given in the following table are given by a French authority and are averages computed on tires from 3 to 4½ inches diameter under usual touring car weight and speed conditions. For larger tires the increase is greater on account of the greater rigidity of the cover walls, resulting in greater internal strains in the fabric at the points of bending.

Initial Pressure in Tire, Cold	Working Pressure in Tire, Warm	Increase Resulting from Work
Lbs. per Sq. In.	*Lbs. per Sq. In.*	*Lbs. per Sq. In.*
71.116	88.183	17.067
85.339	105.750	20.411
99.562	123.546	23.984
113.785	141.920	28.135
128.008	158.588	30.580
142.232	176.368	34.136

STEEL BALLS. "STANDARD" SIZE AND WEIGHTS

Size	Decimal	No. per Pound	Size	Decimal	Ounces
1/16"	.0625	27,904	13/16"	.8125	1 1/2
3/32"	.0937	8,264	7/8"	.8750	1 3/4
1/8"	.1250	3,400	15/16"	.9375	2
5/32"	.1563	1,770	1"	1.000	2 1/2
3/16"	.1875	1,030	1 1/8"	1.125	3 1/2
7/32"	.2188	640	1 1/4"	1.250	4 3/4
1/4"	2500	430	1 3/8"	1.375	6 1/4
9/32"	.2613	300	1 1/2"	1.500	8
5/16"	.3125	220	1 5/8"	1.625	10
11/32"	.2438	165	1 3/4"	1.750	13
3/8"	.3750	125	1 7/8"	1.875	15 1/2
7/16"	.4375	80	2"	2.000	19 1/4
1/2"	.5000	52	2 1/4"	2.250	27
9/16"	.5625	36	2 1/2"	2 500	37
5/8"	.6250	28	2 3/4"	2.750	49
11/16"	.6875	21	3"	3.000	64
3/4"	.7500	16	3 1/4"	3.250	81 1/2
			3 1/2"	3.500	101 1/2
			3 3/4"	3.750	125
			4"	4.000	152

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1909 LINE

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HIGH-GRADE

IGNITION SPECIALTIES

Dash Coils=Marine Box Coils
Make and Break Coils=Spark Plugs
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Manufactured by

Kokomo Electric Co.

Kokomo, Ind., U. S. A.

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DIMENSIONS AND LOAD CAPACITY OF BALL BEARINGS (STANDARD)

Inside Diameter		Outside Diameter		Width or Thickness		Load, Lbs.
Inch	MM.	Inch	MM.	Inch	MM.	
0.3937	10	1.3780	35	0.4331	11	200
0.4724	12	1.4567	37	0.4724	12	250
0.5905	15	1.6535	42	0.5118	13	280
0.6693	17	1.8504	47	0.5512	14	370
0.7874	20	2.0472	52	0.5905	15	450
0.9843	25	2.4409	62	0.6693	17	600
1.1811	30	2.8346	72	0.7480	19	850
1.3780	35	3.1496	80	0.8268	21	1100
1.5748	40	3.5433	90	0.9055	23	1500
1.7717	45	3.9370	100	0.9843	25	1800
1.9685	50	4.3331	110	1.0630	27	2100
2.1654	55	4.7245	120	1.1417	29	2400
2.3622	60	5.1183	130	1.2205	31	2900
2.5591	65	5.5119	140	1.2992	33	3300
2.7559	70	5.9056	150	1.3780	35	4000
2.9528	75	6.2993	160	1.4567	37	4400
3.1496	80	6.6930	170	1.5354	39	5000
3.3465	85	7.0867	180	1.6143	41	5700
3.5433	90	7.4804	190	1.6929	43	6400
3.7402	95	7.8741	200	1.7717	45	7000
3.9370	100	8.4346	215	1.8505	47	7700
4.1339	105	8.8583	225	1.9291	49	8400
4.3331	110	9.4489	240	1.9685	50	10000

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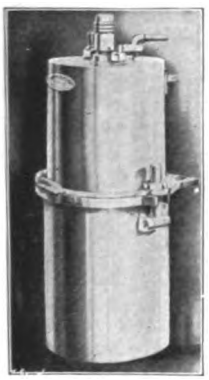

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An automatic tossing carbide basket that rotates carbide.

The same pressure on top of water as in carbide chamber.

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An unfailing independent gas filter.

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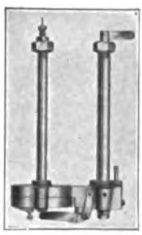

That's it

The valve fitting detached. This fitting contains all the mechanism and working parts of the generator, detachment being made by simply removing 2 nuts on top.

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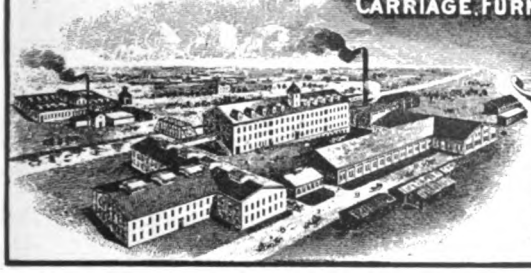

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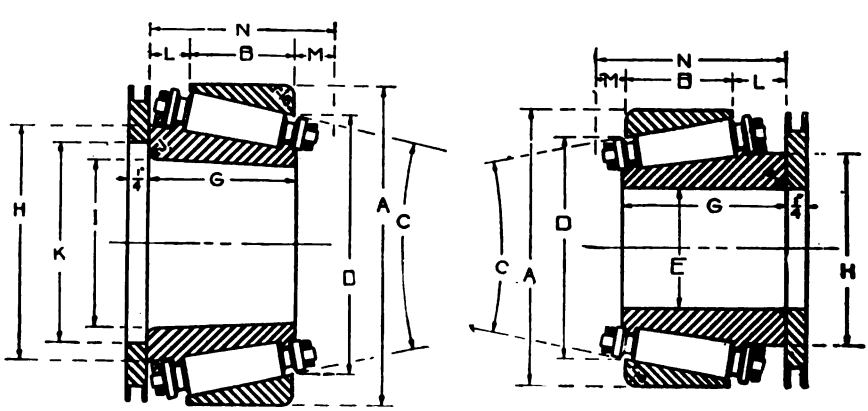
DIMENSIONS AND CAPACITIES OF ROLLER BEARINGS (TIMKEN)

Cone Details						Cup Details		
G Length Approximate	Tapered Hole— I Std.	Straight Hole— E Std.	Load Carrying Capacity, Pounds*	Roll: Body Length Approximate	Roll: Body Diameter Approx.	A Outside Ground Diameter	C Included Angle of Cup	N Over all Length Without Dust Collar
1 1/16	.....	3/4	135	.52	.31	1.8025	20° 6′	1 11/32
1 1/16	1 1/8	.....	200	.52	.31	2.240	24° 49′	1 11/32
1 11/32	.....	15/16	270	.70	.37	2.240	17° 33′	1 5/8
1 7/32	.....	.....	270	.....	.....	.....	.....	1 1/2
1 9/32	1 3/8	.....	335	.70	.37	2.615	20° 40′	1 17/32
1 3/8	.....	1 3/16	335	.70	.37	2.552	20° 12′	1 21/32
1 3/8	.....	1	335	.70	.37	2.4843	19° 14′	1 21/32
1 3/16	.....	.....	335	.....	.....	.....	.....	1 15/32
1 9/32	1 1/2	.....	400	.70	.37	3.000	22° 52′	1 9/16
1 17/32	.....	13/16	470	.84	.42	2.4375	21° 19′	1 13/16
1 1/2	.....	1 3/16	520	.84	.42	2.8593	25° 0′	1 27/32
1 19/32	.....	1	520	.....	.....	.....	.....	1 15/16
1 17/32	.....	1 3/8	575	.84	.42	3.125	27° 23′	1 7/8
1 9/16	.....	1 3/8	625	.84	.42	3.1562	21° 34′	1 27/32
1 11/16	.....	.....	625	.....	.....	.....	.....	1 31/32
1 1/2	.....	1 3/4	675	.84	.42	3.3125	23° 5′	1 13/16
1 15/32	1 31/32	.....	725	.84	.42	3.6718	25° 26′	1 13/16
1 15/32	.....	2 1/2	830	.84	.42	4.4375	30° 0′	1 13/16
2 1/16	.....	1 1/2	1,140	1.20	.49	3.4843	21° 28′	2 7/16
1 7/8	.....	.....	1,140	.....	.....	.....	.....	2 1/4
1 27/32	2 1/8	.....	1,330	1.20	.49	3.9843	25° 12′	2 1/4
2 19/32	.....	1 3/4	1,550	1.29	.54	3.9843	22° 22′	2 13/16
2 3/32	2 5/8	.....	1,935	1.29	.54	4.7343	26° 52′	2 9/16
2 5/32	.....	3	2,065	1.29	.54	5.596	30° 20′	2 1/2
2 27/32	.....	2 1/4	3,680	1.59	.72	5.3437	24° 25′	3 13/32
2 17/32	2 7/8	.....	3,960	1.59	.72	5.8750	27° 8′	3 1/8
2 9/16	3 3/8	.....	5,100	1.59	.72	6.687	29° 53′	3 3/32

*The above loads are safe for speeds not exceeding 500 R.P.M. For speeds from 500 to 1,000 R.P.M. use 75 per cent. of the above rated loads.



The letters in these sections are to be used in connection with the table.

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OUR 17th YEAR IN THE MANUFACTURE OF STORAGE BATTERIES AND ACCESSORIES

The "RELIANCE" AND The "RELIABLE"

STORAGE BATTERY IGNITERS

THE "RELIANCE"

Transparent Celluloid Jars, Open Panelled Iron Box

The plates are suspended and separated by projections on the sides of the jar, leaving a clear view between and beneath them.

We give you the results of 17 years' experience in the manufacture of Storage Batteries of all kinds.

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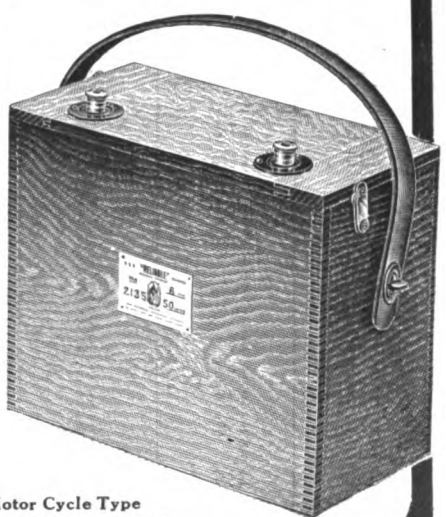
THE "RELIABLE"



Hard Rubber Jars, Polished Oak Case

Rubber handle with brass eyelets. Cells are connected by lead straps with burned joints.

We do not claim to put a quart in a pint measure, but we give the best combination of Capacity, Durability, Efficiency and Finish.

We list 44 styles and sizes including Iron Cased and Motor Cycle Type

The STORAGE BATTERY SUPPLY CO. 241 EAST 27th ST. NEW YORK.

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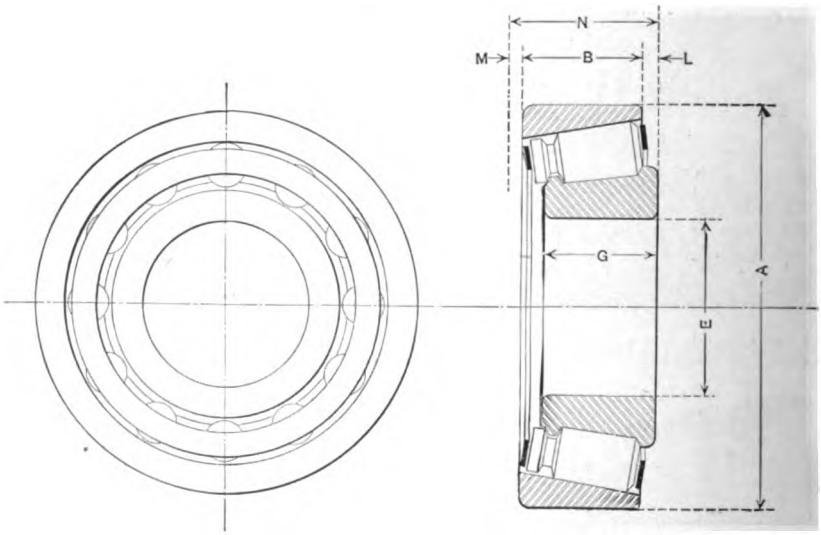
NEW SERIES SHORT ROLLER BEARINGS (TIMKEN) SPECIALLY SUITABLE FOR TRANSMISSION SYSTEMS



NOTE—1/32-inch radius at each end of cone is standard. Total length required for bearing = N = M + B + L.

Capacity in Pounds	E Dia. Hole in Cone, Inches	G Length of Cone, Inches	A Outside Diameter Cup, Inches	B Length of Cup, Inches	L Cone Stands Out of Cup, Inches	M Clearance at Rear of Cup, Inches
270	15/16	3/4	2.2400	13/16	5/32	1/16
270	1	3/4	2.2400	13/16	5/32	1/16
335	1 1/4	3/4	2.6150	13/16	5/32	1/16
335	1 5/16	3/4	2.6150	13/16	5/32	1/16
335	1 3/16	3/4	2.6150	13/16	5/32	1/16
400	1 3/8	3/4	3.0000	3/4	5/32	1/8
400	1 9/16	3/4	3.0000	3/4	5/32	1/8
520	1	7/8	2.8593	15/16	1/8	1/16
520	1 3/16	7/8	2.8593	15/16	1/8	1/16
520	1 5/16	7/8	2.8593	15/16	1/8	1/16
625	1 3/8	7/8	3.1562	15/16	1/8	1/16
625	1 5/8	7/8	3.1562	15/16	1/8	1/16
625	1 1/2	7/8	3.1562	15/16	1/8	1/16
675	1 3/4	7/8	3.3125	15/16	1/8	1/16
725	2	7/8	3.6718	15/16	1/8	1/16
830	2 1/2	7/8	4.4375	15/16	1/8	1/16
1140	1 3/4	1 1/8	3.4843	1 5/16	3/16	1/16
1330	2	1 1/8	3.9843	1 5/16	3/16	1/16
1330	2 1/8	1 1/8	3.9843	1 5/16	3/16	1/16

The above loads are safe for speeds not exceeding 500 R.P.M. For speeds from 500 to 1,000 R.P.M., use 75 per cent. of the above rated loads.

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Combination Oil and Grease Gun

When used for heavy grease the gear is in mesh with the teeth on the plunger and by turning the crank very high pressure is obtained, driving the grease through the nozzle and into the bearing.

The prices of the Guns are:

No. 1, 9"x3" in the Aluminum, $3.75.

No. 2, 7½"x2" in the Aluminum, $3.25.

No. 3, 4½"x2" in the Aluminum, $3.00.

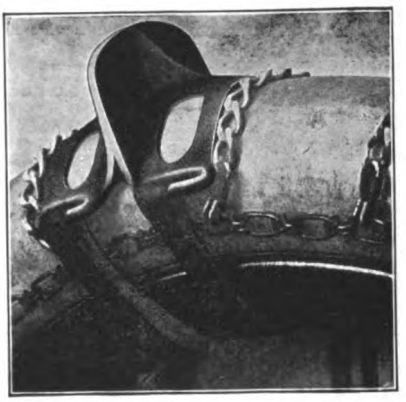
Style C

MUFFLER CUT-OUT

Six sizes from 1 to 3⅝ inches. Price, any size, $3.00 each. Two other styles, any size, $1.25 each.

Emergency Mud Hook

One on each wheel we guarantee will get you out of the mud, sand or snow when everything else fails.



Patent Applied For.

Price, set of 2 with four straps, $2.50
Price, set of 2 without straps, - $1.50

Accompany orders with Express or P. O. money order.

Perfect Whistle Valve

To be used in connection with any horn or whistle. Sizes from one inch up. Price, blanks, any size, $2.75. Threaded, any size, $3.00.

Style A

Style B

PERFECT AUTOMATIC LOCKING BRAKES

Price, Style "A," Black, $2.50
Price, Style "A," Nickel Plated, - - - - - - - $3.25

Price, Style "B," Black, $3.75
Price, Style "B," Nickel Plated, - - - - - - - $4.50

Simple Pedal, Style F, $0.75.

SEND FOR CATALOG.

Manufactured by

Garage Equipment Co.

MILWAUKEE, WIS.

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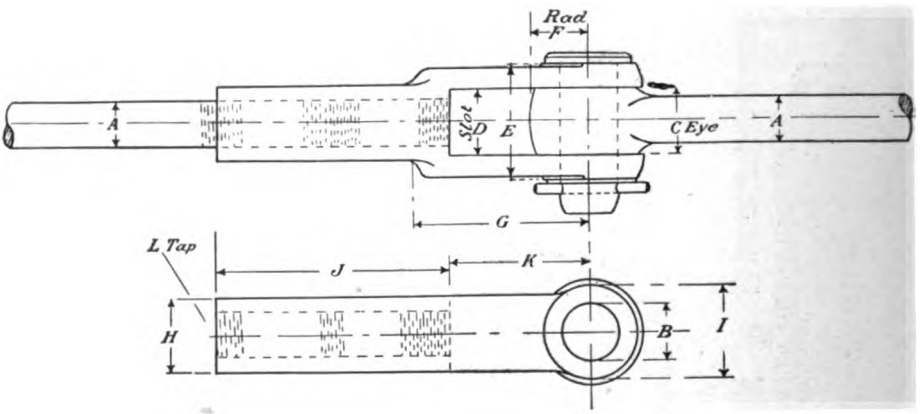
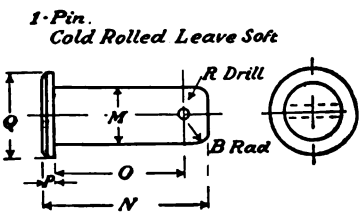
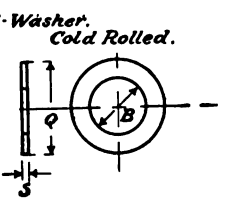
A. L. A. M. STANDARD ADJUSTABLE YOKE AND EYE ROD END.

Material: No. 5 A. L. A. M. Steel. Screw threads on adjustable and eye rod end, A. L. A. M. Standard.







A	1/4	5/16	3/8	7/16	1/2
B	5/16	13/32	15/32	9/16	5/8
C	.432	.495	.588	.651	.770
D	7/16	1/2	19/32	21/32	3/4
E	3/4	7/8	1	1 1/8	1 1/4
F	3/8	7/16	1/2	17/32	5/8
G	1 1/4	1 3/8	1 1/2	1 11/16	1 7/8
H	1/2	9/16	21/32	3/4	13/16
I	11/16	3/4	7/8	15/16	1 1/16
J	1 3/8	1 5/8	1 7/8	2 1/4	2 1/2
K	1	1 1/8	1 1/4	1 3/8	1 1/2
L	A-28	A-24	A-24	A-20	A-20
M	.310	.403	.465	.559	.621
N	1 3/32	1 1/4	1 7/16	1 5/8	1 3/4
O	53/64	61/64	1 3/32	1 17/64	1 3/8
P	3/32	3/32	1/8	1/8	1/8
Q*	1/2	5/8	3/4	7/8	15/16
R	5/64	5/64	7/64	9/64	11/64
S	1/32	1/32	1/32	1/16	1/16

*For 1/2-in. rod, washer = 1-in., outside diameter.

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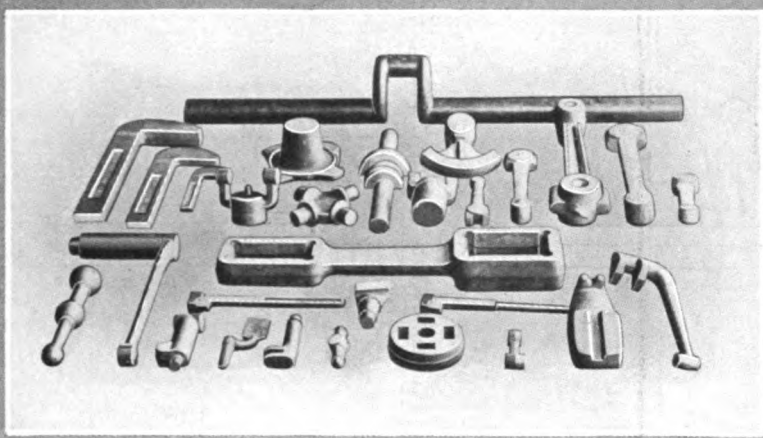
BARNETT DROP FORGING CO.

EAST HAMPTON, MASS.



DROP FORGINGS OF EVERY DESCRIPTION
Special Forgings one of our Features

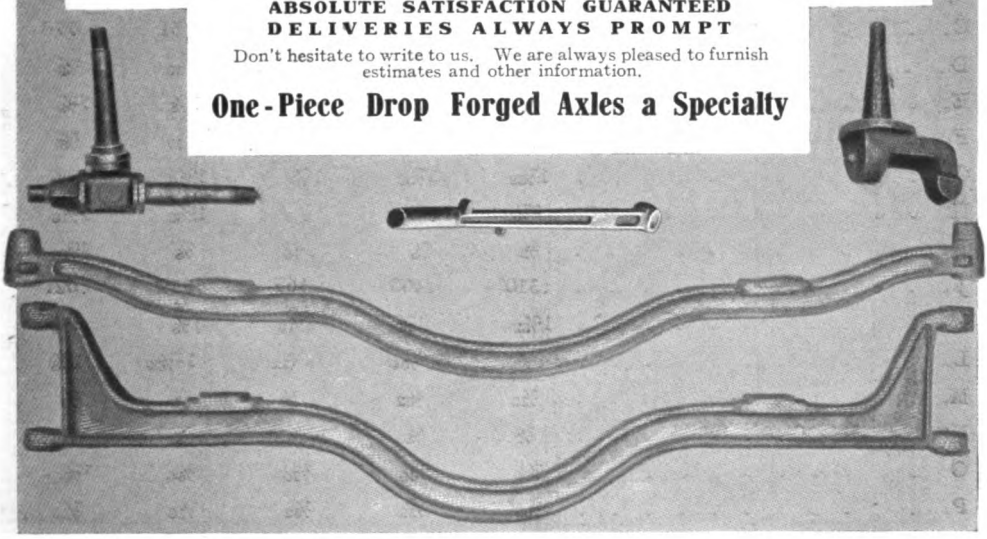
Highest Quality Materials and Workmanship

Unsurpassed facilities for both light and heavy forgings at
ATTRACTIVE PRICES
Send us your blue prints or models and we will do the rest

ABSOLUTE SATISFACTION GUARANTEED
DELIVERIES ALWAYS PROMPT

Don't hesitate to write to us. We are always pleased to furnish estimates and other information.

One-Piece Drop Forged Axles a Specialty



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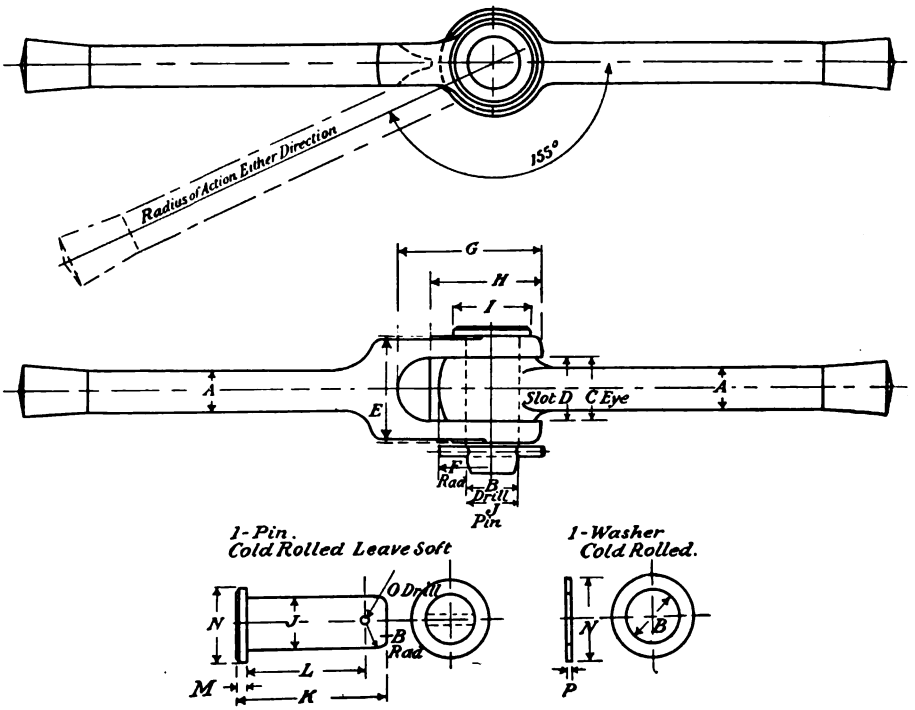
A. L. A. M. STANDARD SOLID YOKE AND EYE ROD END.

Material: No. 5 A. L. A. M. Steel.



A	1/4	5/16	3/8	7/16	1/2
B	5/16	13/32	13/32	9/16	5/8
C	.432	.495	.588	.651	.770
D	7/16	1/2	19/32	21/32	3/4
E	3/4	7/8	1	1 1/8	1 1/4
F	3/8	7/16	1/2	17/32	5/8
G	1 1/32	1 7/32	1 3/8	1 9/16	1 11/16
H	25/32	15/16	1 1/16	1 5/32	1 5/16
I	1/2	5/8	3/4	7/8	15/16
J	.310	.403	.465	.559	.621
K	1 3/32	1 1/4	1 7/16	1 5/8	1 3/4
L	53/64	61/64	1 3/32	1 17/64	1 3/8
M	3/32	3/32	1/8	1/8	1/8
N*	1/2	5/8	3/4	7/8	15/16
O	5/64	5/64	7/64	9/64	11/64
P	1/32	1/32	1/32	1/16	1/16

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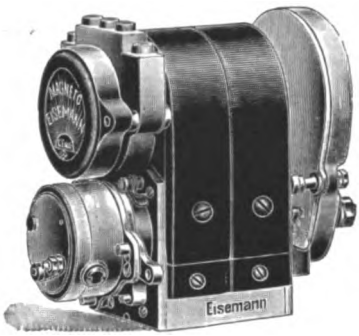
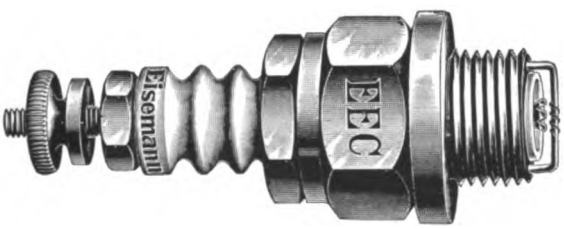


"Eisemann Magnetos"

You can run your motor at *slower speed* with "Eisemann" than any other magneto. Used *exclusively* on **Packard, Peerless, Acme, Winton, Pope Hartford,** and other high-grade American cars, as well as on high-class European cars, such as **Isotta Fraschini, Panhard, Hotchkiss** and others.



Eisemann Spark Plug—A New Idea—Does not collect soot or rust. Spark Gap is permanent. Requiring no adjustment at any time. Send for circular containing prices and full explanation.

Ball Bearings

Chassis. Frames, Transmissions, Gears, Live Rear Axles, Steering Posts, etc.

Steel Pistons and Piston Rings forged by an entirely new process combining greatest resistance, least possible weight. These are the first pistons and rings that have ever been produced in forged steel.

Cylinder Castings Made in France to Order.

LAVALETTE & CO.,

112-14 West 42d St. NEW YORK, N. Y.

ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS' STANDARD FOR HEXAGON HEAD SCREWS, CASTLE AND PLAIN NUTS.

The present United States standards for Bolts, Nuts and Screw-threads were established by the United States Navy Department in May, 1868. These standards remained pre-eminent for many years and have proved of great convenience and value. During recent years, however, manufacturers of fine machinery have found from experience that for a large portion of their work the United States standards for pitch of threads have been too coarse, and the dimensions of heads and nuts too large. In order to secure satisfactory construction special fine pitch screw-threads and smaller nuts have had to be made. The number and variety of these special threads and nuts have finally become such that great confusion, inconvenience and expense have been caused. To overcome this condition the Association of Licensed Automobile Manufacturers has adopted a new Screw Standard which is herewith set forth.

It is assumed that where screws are to be used in soft material, such as cast-iron, brass, bronze or aluminum, the existing United States standard pitches will be used.

A. L. A. M. STANDARD

This standard is to be known as "Association of Licensed Automobile Manufacturers' Standard for Hexagon Head Screws, Castle and Plain Nuts."

The term "Screw" is intended to supplant the present so-called "coupling-bolt" and "cap-screw."

The term "Plain Hexagon Nut" is intended to supplant the present so-called "United States Standard Nut."

The term "Castle Nut" is given to a new nut, which is intended to be used where a positive locking system is desired.

The term "Facing" is given to a relieved portion under the screw heads, castle nuts and plain nuts.

The detailed dimensions and specifications of the screws, castle and plain nuts, from one-quarter ($\frac{1}{4}''$) inch to ($1''$) inch inclusive, are as follows:

(*Continued on page 482.*)

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Hartford Machine Screw Company

Any Turned or Milled Piece used on any automobile is within our line of manufacture

Gear Blanks	Thumb Nuts
Hub Caps	Clutch Parts
Turnbuckles	Turned Washers
Screws	Turned Rivets
Nuts	Transmission Parts
Studs	Crank Sleeves
Cam Rollers	Plugs
Taper Pins	Knobs
Spark Plugs	Posts
Pinions	Yoke Pins
Ball Cups	Collars
Ball Cones	Dowel Pins
Chain Studs	Coupling Bolts
Chain Rolls	Couplings
Binding Posts	Steering Gear Spindles
Valve Stems	

Hartford, Conn., U.S.A.

A. L. A. M. Standard Screws and Nuts

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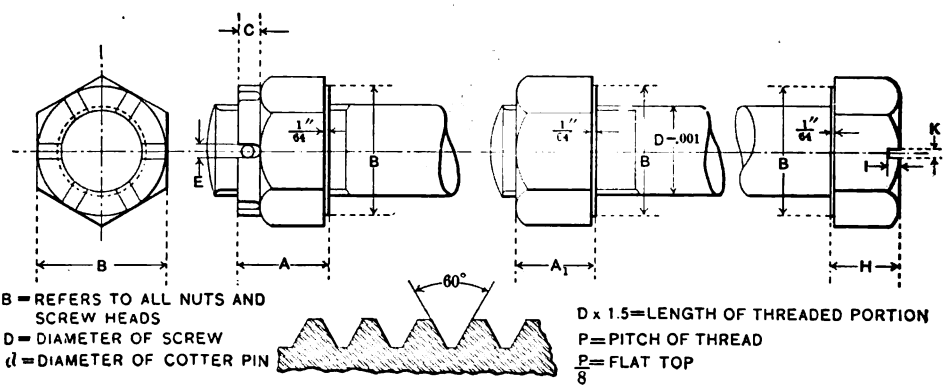
DIMENSIONS



D	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1
P	28	24	24	20	20	18	18	16	16	14	14
A	9/32	21/64	13/32	29/64	9/16	39/64	23/32	49/64	13/16	29/32	1
A_1	7/32	17/64	21/64	3/8	7/16	31/64	35/64	19/32	21/32	49/64	7/8
B	3/8	1/2	9/16	11/16	3/4	7/8	15/16	1	1 1/8	1 1/4	1 7/16
C	3/32	3/32	1/8	1/8	3/16	3/16	1/4	1/4	1/4	1/4	1/4
E	5/64	5/64	1/8	1/8	1/8	5/32	5/32	5/32	5/32	5/32	5/32
H	3/16	15/64	9/32	21/64	3/8	27/64	15/32	33/64	9/16	21/32	3/4
I	3/32	7/64	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
K	1/16	1/16	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32
d	1/16	1/16	3/32	3/32	3/32	1/8	1/8	1/8	1/8	1/8	[illegible]

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WE have provided ourselves with a Supply of Special Material, also Taps and Gauges, and are prepared to furnish

Hexagon Head Screws, Nuts, etc.

which we guarantee fully up to the Specifications of the A. L. A. M.

Send us your specification

DETROIT SCREW WORKS

DETROIT, MICH.

Standard Set and Cap Screws, Steel Taper Pins, Coupling Bolts, Nuts, etc.

"ANYTHING TURNED FROM BAR"

HARDENED and GROUND WORK OUR SPECIALTY

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SPECIFICATIONS

Material.—A better material than ordinarily used for screws is deemed necessary. The selection of a better material depends to a considerable extent upon the possibility of commercially machining it in screw machines. Such material has been found in several qualities of steel, having a tensile strength of not less than one hundred thousand (100,000 lb.) pounds per square inch, and an elastic limit of sixty thousand (60,000 lb.) pounds per square inch, as compared with fifty or sixty thousand (50,000 or 60,000 lb.) pounds per square inch tensile strength and thirty-five thousand (35,000 lb.) pounds per square inch elastic limit now in common use.

The Screws and Nuts described in this Standard are to be made of this better material.

Screws are to be left soft.

Screw Heads are to be left soft.

The Plain Nuts are to be left soft.

The Castle Nuts are to be case-hardened.

Tolerance.—The body diameter of the screws shall be one-thousandth (.001″) inch less than the nominal diameter, with a plus tolerance of zero and a minus tolerance of two-thousandths (.002″) inch.

The nuts shall be a good fit, without perceptible shake.

The clearance between tops of threads and bottoms of threads in nuts shall be that existing in the present practice of machine screw makers; that is, the tap shall be between two-thousandths (.002″) inch and three-thousandths (.003″) inch large.

Finish.—Screw heads shall be flat chamfered.

Plain nuts shall be flat chamfered.

Castle nuts shall be chamfered.

What is understood by screw makers as "semi-finish" shall be the finish for all heads and nuts.

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That New York to Paris Race

THE THOMAS FLYER which beat them all across the country was equipped with a FEDDERS SQUARE TUBE RADIATOR. It stood the bumps without injury. It never needed repairs and the car never overheated. But FEDDERS RADIATORS are made for just this kind of work, they stand the racket.

"ASK THE CHAUFFEUR"

FEDDERS MFG. WORKS, BUFFALO, N.Y.

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INTERNATIONAL (METRIC SYSTEM) STANDARD 60° THREADS

Diameter of Screw	Pitch	Diameter at Root of Thread	Width of Flat at Top and Bottom of Thread
Millimetres	*Millimetres*	*Millimetres*	*Millimetres*
3	.5	2.35	.06
4	.75	3.03	.09
5	.75	4.03	.09
6	1.0	4.70	.13
7	1.0	5.70	.13
8	1.0	6.70	.13
8	1.25	6.38	.16
9	1.0	7.70	.13
9	1.25	7.38	.16
10	1.5	8.05	.19
11	1.5	9.05	.19
12	1.5	10.05	.19
12	1.75	9.73	.22
14	2.0	11.40	.25
16	2.0	13.40	.25
18	2.5	14.75	.31
20	2.5	16.75	.31
22	2.5	18.75	.31
22	3.0	18.10	.38
24	3.0	20.10	.38
26	3.0	22.10	.38
27	3.0	23.10	.38
28	3.0	24.10	.38
30	3.5	25.45	.44
32	3.5	27.45	.44
33	3.5	28.45	.44
34	3.5	29.45	.44
36	4.0	30.80	.5
38	4.0	32.80	.5
39	4.0	33.80	.5
40	4.0	34.80	.5
42	4.5	36.15	.56
44	4.5	38.15	.56
45	4.5	39.15	.56
46	4.5	40.15	.56
48	5.0	41.51	.63
50	5.0	43.51	.63
52	5.0	45.51	.63

NOTE—This thread is largely used by Italian constructors.

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Keystone Grease

THE WORLD'S GREATEST LUBRICANT

is not affected by either heat or cold and works well under all climatic conditions. KEYSTONE GREASE is NOT like any other lubricant, and for that reason it is endorsed by the leading engineers, manufacturers and automobile owners throughout the world. Being free from animal and vegetable matter, it retains its permanency of composition, therefore, decomposition or rancidity is impossible.

It never "thins out" in summer or "stiffens up" in winter, and contains no "free acid," which attacks the metallic surface of bearings and gears.

Automobile supply dealers and garages write for special proposition.

It is suitable for every bearing in the automobile except the cylinders.

We have no connection with the oil trust.

KEYSTONE LUBRICATING CO.

PHILADELPHIA, PA.

BRANCHES:
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Southern Office, 610 Chartres St., New Orleans, La.
Chicago Office, 1210 Tacoma Building.
Northwestern Office, 502 McPhee Bldg., Denver.
San Francisco Office and Warehouse, 268 Market St.
New York City Office, 96 Warren St.

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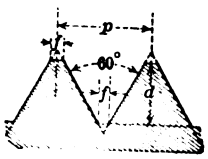
UNITED STATES 60° SCREW THREADS



Formula
$$\begin{cases} p = \text{pitch} = \dfrac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .6495 \\ f = \text{flat} = \dfrac{p}{8} \end{cases}$$

Diameter of Screw	Threads to Inch	Diameter at Root of Thread	Width of Flat
1/4	20	.185	.0063
5/16	18	.2403	.0069
3/8	16	.2936	.0078
7/16	14	.3447	.0089
1/2	13	.4001	.0096
9/16	12	.4542	.0104
5/8	11	.5069	0114
3/4	10	.6201	.0125
7/8	9	.7307	.0139
1	8	.8376	.0156
1 1/8	7	.9394	.0179
1 1/4	7	1.0644	.0179
1 3/8	6	1.1585	.0208
1 1/2	6	1.2835	.0208
1 5/8	5 1/2	1.3888	.0227
1 3/4	5	1.4902	.0250
1 7/8	5	1.6152	.0250
2	4 1/2	1.7113	.0278
2 1/4	4 1/2	1.9613	.0278
2 1/2	4	2.1752	.0313
2 3/4	4	2.4252	.0313
3	3 1/2	2.6288	.0357
3 1/4	3 1/2	2.8788	.0357
3 1/2	3 1/4	3.1003	.0385
3 3/4	3	3.3170	.0417
4	3	3.5670	.0417
4 1/4	2 7/8	3.7982	.0435
4 1/2	2 3/4	4.0276	.0455
4 3/4	2 5/8	4.2551	.0476
5	2 1/2	4.4804	.0500
5 1/4	2 1/2	4.7304	.0500
5 1/2	2 3/8	4.9530	.0526
5 3/4	2 3/8	5.2030	.0526
6	2 1/4	5.4226	.0556

Standard Proportions for Machine Screws

The report of the committee on standard proportions for machine screws of the American Society of Mechanical Engineers is published in the October, 1906, proceedings of the society. The report is substantially in agreement with the recommendations adopted at the joint meeting held in New York, April 11, 1904.

The committee believes the following combined details to be essential in establishing and maintaining a standard for the diameters, threads and heads of machine screws, including, as it does, diameters, threads and limits for the taps which are to be used in connection therewith: (*a*) form of thread, (*b*) diameters, (*c*) number of threads per inch, (*d*) standard reference thread gauges, basic and for screws and taps, (*e*) working gauges for screws and taps, (*f*) limits of variation, measured in the angle of the thread, (*g*) limits of variation in external diameter, (*h*) limits of variation in the pitch of the thread screws and taps, (*k*) proportions of the heads.

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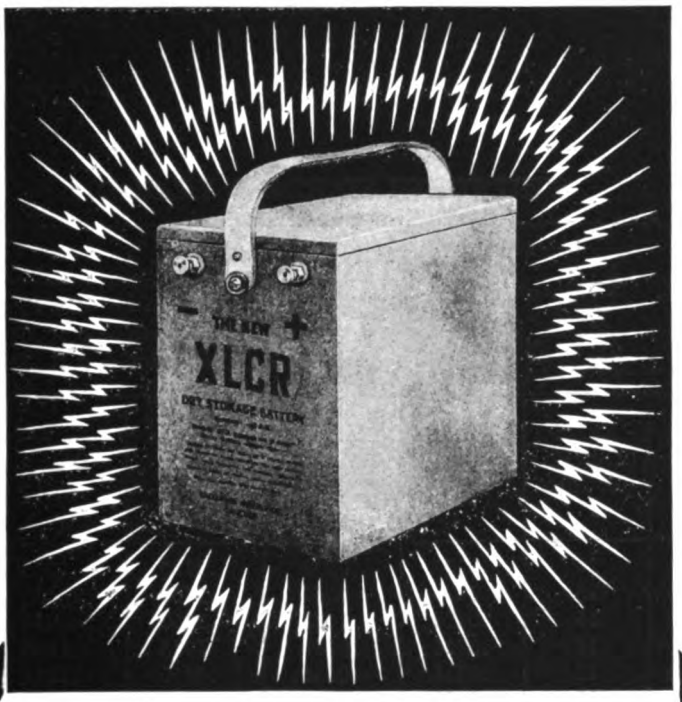

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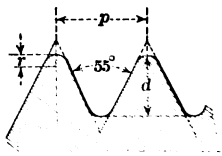
WHITWORTH STANDARD THREAD



Formula

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .64933$$

$$r = \text{radius} = p \times .1373$$

Full Diameter	No. of Threads per Inch	Pitch	Standard Depth of Thread	Effective Diameter	Core Diameter	Cross Sectional Area at Bottom of Thread
1/4 (.25)	20	.0500	.0320	.2180	.1860	.0272
5/16 (.3125)	18	.0556	.0356	.2769	.2414	.0458
3/8 (.375)	16	.0625	.0400	.3350	.2950	.0683
7/16 (.4375)	14	.0714	.0457	.3918	.3460	.0940
1/2 (.5)	12	.0833	.0534	.4466	.3933	.1215
9/16 (.5625)	12	.0833	.0534	.5091	.4558	.1632
5/8 (.625)	11	.0909	.0582	.5668	.5086	.2032
11/16 (.6875)	11	.0909	.0582	.6293	.5711	.2562
3/4 (.75)	10	.1000	.0640	.6860	.6219	.3038
13/16 (.8125)	10	.1000	.0640	.7485	.6844	.3679
7/8 (.875)	9	.1111	.0711	.8039	.7327	.4216
1	8	.1250	.0800	.9200	.8399	.5540
1 1/8 (1.125)	7	.1429	.0915	1.0335	.9420	.6969
1 1/4 (1.25)	7	.1429	.0915	1.1585	1.0670	.8942
1 3/8 (1.375)	6	.1667	.1067	1.2683	1.1616	1.0597
1 1/2 (1.5)	6	.1667	.1067	1.3933	1.2866	1.3001
1 5/8 (1.625)	5	.2000	.1281	1.4969	1.3689	1.4718
1 3/4 (1.75)	5	.2000	.1281	1.6219	1.4939	1.7528
2	4 1/2	.2222	.1423	1.8577	1.7154	2.3111
2 1/4 (2.25)	4	.2500	.1601	2.0899	1.9298	2.9249
2 1/2 (2.5)	4	.2500	.1601	2.3399	2.1798	3.7318
2 3/4 (2.75)	3 1/2	.2857	.1830	2.5670	2.3841	4.4641
3	3 1/2	.2857	.1830	2.8170	2.6341	5.4496
3 1/4 (3.25)	3 1/4	.3077	.1970	3.0530	2.8560	6.4063
3 1/2 (3.50)	3 1/4	.3077	.1970	3.3030	3.1060	7.5769
3 3/4 (3.75)	3	.3333	.2134	3.5366	3.231	8.6732
4	3	.3333	.2134	3.7866	3.5731	10.0272
4 1/2 (4.50)	2 7/8	.3478	.2227	4.2773	4.0546	12.9118
5	2 3/4	.3636	.2328	4.7672	4.5343	16.1477
5 1/2 (5.50)	2 5/8	.3810	.2439	5.2561	5.0121	19.7301
6	2 1/2	.4000	.2561	5.7439	5.4877	23.6521

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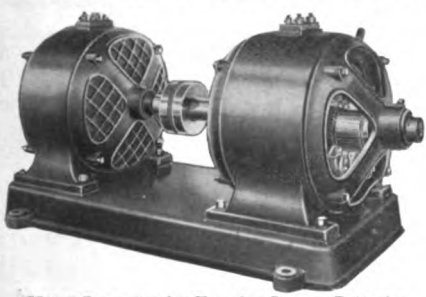

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DRILL SIZES FOR STANDARD THREADS

These sizes give an allowance above the bottom of thread on sizes 3/16 to 2; varying respectively as follows: for "V" Threads, .010″ to .055″; for U. S. S. and Whitworth threads .005″ to .027″.

These are found by adding to the size at bottom of thread 1/4 of the pitch for "V" threads, and 1/8 of the pitch for U. S. S. and Whitworth, the pitch being equal to 1″ ÷ No. of threads per 1″.

In practice it is better to use a larger drill if the exact size called for cannot be had.

Size Screw	No. of Threads	Size of Drill			Size Screw	No. of Threads	Size of Drill		
		U. S. S.	"V"	W.			U. S. S.	"V"	W.
1/4	24	.201	.196	.202	15/16	9	.808	.790	.810
1/4	20	.191	.184	.192	1	8	.854	.832	.856
5/16	18	.248	.239	.249	1 1/16	8	.917	.894	.919
3/8	16	.302	.293	.303	1 1/8	7	.957	.932	.960
7/16	14	.354	.345	.355	1 1/4	7	1.082	1.057	1.085
1/2	13	.409	.399	.410	1 3/8	6	1.179	1.144	1.182
1/2	12	.402	.391	.403	1 1/2	6	1.304	1.269	1.307
9/16	12	.465	.453	.466	1 5/8	5 1/2	1.412	1.372	1.416
5/8	11	.518	.506	.520	1 5/8	5	1.390	1.347	1.394
11/16	11	.581	.568	.583	1 3/4	5	1.515	1.472	1.519
3/4	10	.632	.618	.634	1 7/8	5	1.640	1.597	1.644
13/16	10	.695	.680	.697	1 7/8	4 1/2	1.614	1.566	1.619
7/8	9	.745	.728	.747	2	4 1/2	1.739	1.691	1.744

DRILL SIZES FOR A. L. A. M. THREADS

The Following Tabulation Sets Forth the Size of Drill Used for A. L. A. M. Standard Taps, as Recommended by the Mechanical Branch

Size of Taps	Size of Drill	
	U. S. Standards	A. L. A. M. Standards
3/16 in. x 32 Threads	.....	5/32 in.
1/4 " x 28 "	13/64 in.	7/32 "
5/16 " x 24 "	1/4 "	17/64 "
3/8 " x 24 "	19/64 "	21/64 "
7/16 " x 20 "	11/32 "	3/8 "
1/2 " x 20 "	25/64 "	29/64 "
9/16 " x 18 "	29/64 "	1/2 "
5/8 " x 18 "	33/64 "	9/16 "
11/16 " x 16 "	37/64 "	39/64 "
3/4 " x 16 "	39/64 "	43/64 "
7/8 " x 14 "	47/64 "	25/32 "
1 " x 14 "	53/64 "	59/64 "

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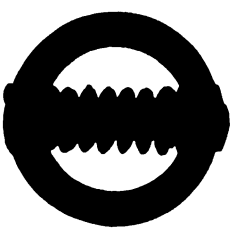

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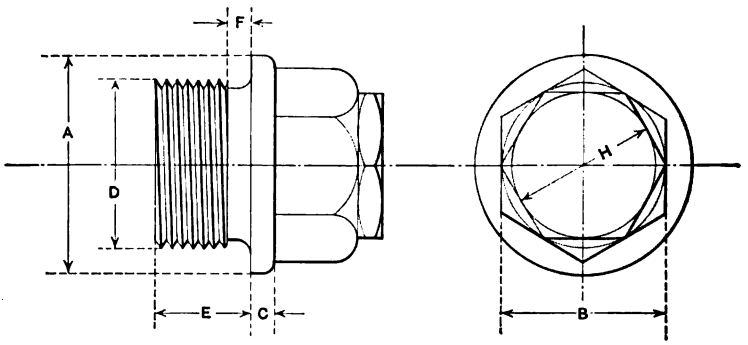
A. L. A. M. STANDARD SPARK PLUG

The spark plug adopted as a standard has a ⅞-inch diameter, straight thread, 18 pitch, and the design and dimensions shown in the following drawing and specifications:



A—One and one-eighth inch (1⅛″).

B—Seven-eighths inch (⅞″).

C—One-eighth inch (⅛″).

D—Seven-eighths inch (⅞″).

E—Not less than one-half inch (min. ½″).

F—Not more than one-eighth inch (max. ⅛″). (Depth of recess—not over depth of thread).

H—Three-quarters inch (¾″).

SPECIFICATIONS.

STOCK—1⅛ inch round.

HEAD FORM—Milled Hex.
SHORT DIAMETER—⅞ inch.

FLANGE FORM—Circular.
DIAMETER—1⅛ inch.
THICKNESS—⅛ inch.
FACE—Annular seat ⅛ inch wide. (Suitable for McKim Type Copper-Asbestos Gasket.)

BLANK FOR THREAD—DIAMETER—⅞ inch.
LENGTH—Not less than ½ inch.

RECESS ADJACENT TO FLANGE—WIDTH—Not over ⅛ inch.
DEPTH—Not over depth of thread.

THREAD DIAMETER—⅞ inch straight.
PITCH—18.
FORM—U. S. Standard.
CUT—Perfect into recess.

PACKING-GLAND NUT HEAD—FORM—Hexagonal.
SHORT DIAMETER—¾ inch.

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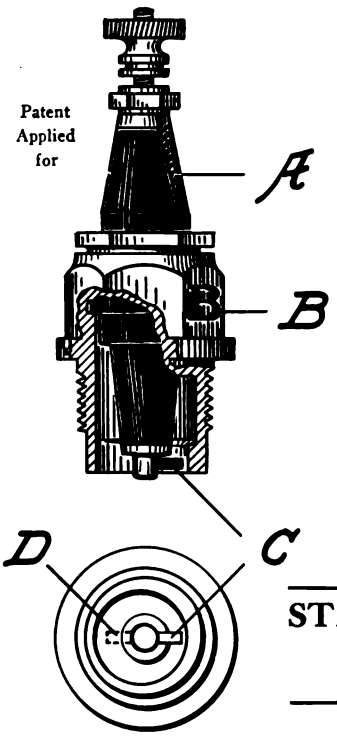
The "Eccentric" Plug



At last there is a plug worth while, a plug in which the spark gap is adjustable from minimum to maximum length by simply turning the core half around in the shell. There is but one spark point which is rigidly secured to end of core bolt and which projects at right angle a safe, sane and sure construction.

The length of spark gap is indicated by a notch on core which points to indicating letters on the shell nut. Changes are made without removing shell from engine.

The core is double-insulated and so made as to prevent splitting or cracking, requires no gaskets or packing, and will hold the highest compression and carries a guarantee as to operation for a year.

This is a plug for car makers and dealers, because it is a whole lot of spark plug efficiency and reliability at a low cost; let us quote you.

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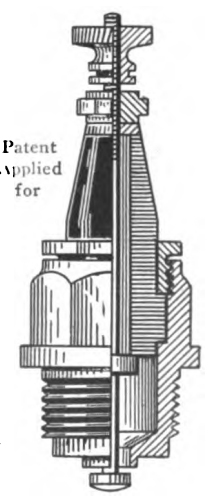
The "Cirkle-Fyre" Plug

This plug is quite different in design from our Eccentric Plug shown above, and is of the closed type with a circular spark gap. It is as thoroughly well made as our Eccentric Plug, and carries a year's guarantee.

This plug is designed to be as good a plug as there is made and is made to sell at a low price. It will pay you to investigate both this and the Eccentric Plug, and there's a deal of money to be picked up in handling them to your customers. Let us afford you complete details.



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DIMENSIONS OF SQUARE AND HEXAGON BOLT HEADS AND SIZE OF STOCK REQUIRED.

United States Standard Sizes.

Diameter	Distance Across Flats, Square and Hexagon	Distance Across Corners, Hexagon	Thickness of Head	Stock for Square Head	Stock for Hexagon Head	Diameter
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1/4	1/2	9/16	1/4	1 9/32	1 3/32	1/4
3/8	11/16	25/32	11/32	1 1/2	1 1/4	3/8
1/2	7/8	1	7/16	1 23/32	1 1/2	1/2
5/8	1 1/16	1 7/32	17/32	2	1 11/16	5/8
3/4	1 1/4	1 7/16	5/8	2 7/32	1 15/16	3/4
7/8	1 7/16	1 21/32	21/32	2 1/2	2 5/32	7/8
1	1 5/8	1 7/8	13/16	2 3/4	2 3/8	1
1 1/8	1 13/16	2 3/32	29/32	3	2 19/32	1 1/8
1 1/4	2	2 5/16	1	3 1/4	2 27/32	1 1/4
1 3/8	2 3/16	2 1/2	1 3/32	3 9/16	3	1 3/8
1 1/2	2 3/8	2 3/4	1 3/16	3 13/16	3 5/16	1 1/2
1 5/8	2 9/16	2 15/16	1 9/32	4 1/16	3 1/2	1 5/8
1 3/4	2 3/4	3 3/16	1 3/8	4 3/8	3 3/4	1 3/4
1 7/8	2 15/16	3 13/32	1 15/32	4 5/8	4	1 7/8
2	3 1/8	3 5/8	1 9/16	4 7/8	4 1/4	2
2 1/4	3 1/2	4 1/16	1 3/4	5 7/16	4 25/32	2 1/4
2 1/2	3 7/8	4 1/2	1 15/16	5 15/16	5 3/16	2 1/2
2 3/4	4 1/4	4 7/8	2 1/8	6 7/16	5 1/2	2 3/4
3	4 5/8	5 11/32	2 5/16	7	6 1/16	3

Manufacturers' Standard Sizes.

Diameter	Distance Across Flats, Square	Distance Across Flats, Hexagon	Thickness of Head	Stock for Square Head	Stock for Hexagon Head	Diameter
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1/4	3/8	7/16	3/16	17/32	23/32	1/4
3/8	9/16	5/8	9/32	13/16	15/16	3/8
1/2	3/4	13/16	3/8	1 1/16	1 3/32	1/2
5/8	15/16	1	15/32	1 11/32	1 13/32	5/8
3/4	1 1/8	1 3/16	9/16	1 5/8	1 9/16	3/4
7/8	1 5/16	1 3/8	21/32	1 7/8	1 7/8	7/8
1	1 1/2	1 9/16	3/4	2 5/32	2 1/32	1
1 1/8	1 11/16	1 3/4	27/32	2 13/32	2 7/32	1 1/8
1 1/4	1 7/8	1 15/16	15/16	2 11/16	2 7/16	1 1/4
1 3/8	2 1/16	2 1/8	1 1/16	3 1/32	2 27/32	1 3/8
1 1/2	2 1/4	2 5/16	1 1/8	3 7/32	3	1 1/2
1 5/8	2 7/16	2 1/2	1 1/4	3 19/32	3 1/4	1 5/8
1 3/4	2 5/8	2 11/16	1 5/16	3 3/4	3 15/32	1 3/4
1 7/8	2 13/16	2 7/8	1 7/16	4 3/32	3 23/32	1 7/8
2	3	3 1/16	1 1/2	4 5/16	4	2
2 1/4	3 3/8	3 7/16	1 3/4	5	4 9/16	2 1/4
2 1/2	3 3/4	3 13/16	1 7/8	5 3/8	4 13/16	2 1/2
2 3/4	4 1/8	4 3/16	2 1/16	5 29/32	5 3/8	2 3/4
3	4 1/2	4 9/16	2 1/4	6 7/16	5 11/16	3

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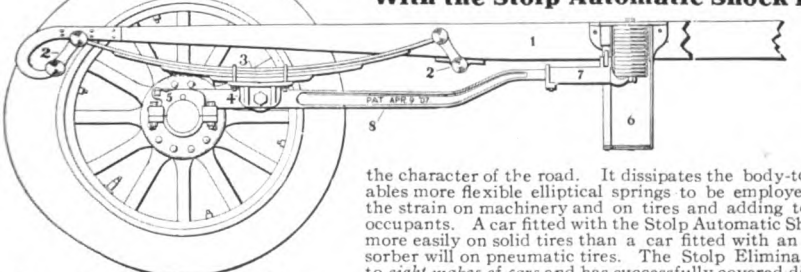

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UNITED STATES STANDARD BOLTS AND NUTS.

Diameter of Bolt Inches	Area at Bottom of Thread	Tensile Strength at 10,000 Pounds per Square Inch	Threads per Inch	Thickness of Head.	Thickness of Nut	Short Diameter Square or Hexagon Head or Nut	Long Diameter Square Head or Nut	Long Diameter Hexagon Head or Nut	Weight Each Square Nut	Weight Each Hexagon Nut	Weight per 100 Square Nuts	Weight per 100 Hexagon Nuts	Weight per Inch Length of Bolt
1/4	.0269	269	20	1/4	1/4	1/2	11/16	9/16	.0138	.0131	1.38	1.31	.0136
5/16	.0454	454	18	19/64	5/16	19/32	13/16	11/16	.0231	.0192	2.31	1.92	.0213
3/8	.0678	678	16	11/32	3/8	11/16	1	13/16	.0426	.0333	4.26	3.33	.0306
7/16	.0933	933	14	25/64	7/16	25/32	1 1/8	7/8	.0513	.0500	6.13	5.00	.0417
1/2	.1257	1,257	13	7/16	1/2	7/8	1 1/4	1	.0893	.0700	8.93	7.00	.0545
5/8	.2018	2,018	11	17/32	5/8	1 1/16	1 1/2	1 1/4	.1560	.1350	15.60	13.50	.0852
3/4	.3020	3,020	10	5/8	3/4	1 1/4	1 3/4	1 7/16	.2630	.2220	26.30	22.20	.1227
7/8	.4193	4,193	9	23/32	7/8	1 7/16	2 1/16	1 11/16	.3570	.3240	35.70	32.40	.1670
1	.5510	5,510	8	13/16	1	1 5/8	2 5/16	1 7/8	.5880	.4630	58.80	46.30	.2181
1 1/8	.6931	6,931	7	29/32	1 1/8	1 13/16	2 9/16	2 1/16	.7690	.6760	76.90	67.60	.2760
1 1/4	.8899	8,899	7	1	1 1/4	2	2 13/16	2 5/16	1.04	.9010	104	90.10	.3410
1 3/8	1.0541	10,541	6	1 3/32	1 3/8	2 3/16	3 1/8	2 1/2	1.43	1.18	143	118	.4120
1 1/2	1.2938	12,938	6	1 3/16	1 1/2	2 3/8	3 3/8	2 3/4	1.72	1.47	172	147	.4900
1 3/4	1.7441	17,441	5	1 3/8	1 3/4	2 3/4	3 7/8	3 3/16	2.94	2.50	294	250	.6680
2	2.3001	23,001	4½	1 9/16	2	3 1/8	4 7/16	3 5/8	4.35	3.45	435	345	.8720

TABLE OF RIVETS IN 100 POUNDS.

Approximate Number

Length Rivets	Diameter of Rivets											
	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	11/16	3/4	7/8	1
1/2	17500	15900	8000	5100	3200	1900	.....	.....	.....	.....	.....	....
5/8	16000	13800	7000	4500	2900	1800	.....	.....	.....	.....	.....	....
3/4	14400	12200	6300	4100	2373	1476	1103	642	.....	.....	.....	....
7/8	13500	10900	5700	3700	2190	1371	1030	604	.....	.....	.....	....
1	12600	9800	5200	3400	2034	1280	968	571	400	345	....	....
1 1/8	11600	9000	4700	3100	1898	1200	910	541	382	322	208	....
1 1/4	10800	8300	4400	2900	1780	1129	862	514	365	311	206	....
1 3/8	10000	7600	4100	2700	1675	1066	815	489	350	295	204	....
1 1/2	9300	7100	4000	2500	1582	1010	776	462	335	284	201	....
1 5/8	8700	.....	3800	2300	1493	960	740	446	324	275	199	132
1 3/4	8100	6300	3500	2200	1424	914	707	428	311	266	192	128
1 7/8	.....	.....	3400	2000	1356	872	672	411	302	257	185	124
2	.....	5600	3000	1900	1295	834	648	395	293	249	178	120
2 1/8	.....	.....	.....	.....	1238	800	623	381	285	240	172	116
2 1/4	.....	5000	2800	1800	1187	768	599	367	277	233	167	112
2 3/8	.....	.....	.....	.....	1139	738	577	354	269	226	162	108
2 1/2	.....	4600	2500	1700	1095	711	556	343	261	219	157	104
2 5/8	.....	.....	.....	.....	1052	687	537	332	253	212	152	100
2 3/4	.....	4200	2300	1500	1017	662	519	321	245	206	148	96
2 7/8	.....	.....	.....	.....	982	636	503	311	237	201	144	92
3	.....	3900	2200	1400	949	611	487	302	230	196	140	88

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1¼ and smaller proved to 300 pounds per square inch by hydraulic pressure.
1½ and larger proved to 500 pounds per square inch by hydraulic pressure.

Inside diameter.	Actual Outside Diameter.	Thickness.	Actual Inside Diameter.	Inside Circumference.	Outside Circumference.	Length of Pipe per square foot of inside surface.	Length of Pipe per square foot of outside surface.	Inside Area.	Outside Area.	Length of Pipe containing one cubic foot.	Weight per foot.	No. of Threads per inch of screw.	Taper of threads per inch of screw.
Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ft.*	*Ft.*	*Ins.*	*Ins.*	*Ft.*	*Lbs.*		*In.*
⅛	0.405	0.068	0.270	0.848	1.272	14.15	9.44	0.0572	0.129	2500.	0.243	27	1/32
¼	.54	.088	.364	1.144	1.696	10.50	7.075	.1041	.229	1385.	.422	18	1/32
⅜	.675	.091	.494	1.552	2.121	7.67	5.657	.1916	.358	751.5	.561	18	1/32
½	.84	.109	.623	1.957	2.652	6.13	4.502	.3048	.554	472.4	.845	14	1/32
¾	1.05	.113	.824	2.589	3.299	4.635	3.637	.5333	.866	270.	1.126	14	1/32
1	1.315	.134	1.048	3.292	4.134	3.679	2.903	.8627	1.357	166.9	1.670	11½	1/32
1¼	1.66	.140	1.380	4.335	5.215	2.768	2.301	1.496	2.164	96.25	2.258	11½	1/32
1½	1.90	.145	1.611	5.061	5.969	2.371	2.01	2.038	2.835	70.65	2.694	11½	1/32
2	2.375	.154	2.067	6.494	7.461	1.848	1.611	3.355	4.430	42.36	3.600	11½	1/32
2½	2.875	.204	2.468	7.754	9.032	1.547	1.328	4.783	6.491	30.11	5.773	8	1/32
3	3.50	.217	3.067	9.636	10.996	1.245	1.091	7.388	9.621	19.49	7.547	8	1/32

SIZING AND CUTTING OF GEAR WHEELS.

The word "diameter," when applied to gears, is always understood to mean the pitch diameter.

Diametral pitch of the gear is the number of teeth to each inch of its pitch diameter.

If a gear has 40 teeth and the pitch diameter is 4 inches there are ten teeth to each inch of the pitch diameter, and the diametral pitch is 10, or in other words the gear is 10 diametral pitch.

Circular pitch is the distance from the center of one tooth to the center of the next tooth, measured along the pitch circle.

If the distance from the center of one tooth to the center of next tooth, measured along the pitch circle, is ½ inch the gear is ½ inch circular pitch.

The diametral pitch given, to obtain the circular pitch divide 3.1416 by the diametral pitch.

If the diametral pitch is 4 divide 3.1416 by 4, and the quotient, .7854 inch, is the circular pitch.

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The circular pitch given, to obtain the diametral pitch divide 3.1416 by the circular pitch.

If the circular pitch is 2 inches, divide 3.1416 by 2, and the quotient, 1.5708, is the diametral pitch.

The number of teeth and the diametral pitch given, to obtain the pitch diameter divide the number of teeth by the diametral pitch.

If the number of teeth is 40 and the diametral pitch 4 divide 40 by 4, and the quotient, 10, is the pitch diameter.

The number of teeth and the diametral pitch given, to obtain the whole diameter or size of blank of gear add 2 to the number of teeth and divide by the diametral pitch.

If the number of teeth is 40 and the diametral pitch is 4 add 2 to the 40, making 42, and divide by 4; the quotient, 10½ is the whole diameter of the gear or blank.

The number of teeth and the diameter of the blank given, to obtain the diametral pitch add 2 to the number of teeth and divide by the diameter of the blank.

If the number of teeth is 40, and the diameter of the blank is 10½ inches, add 2 to the number of teeth, making 42, and divide by 10½; the quotient, 4, is the diametral pitch.

The pitch diameter and the diametral pitch given, to obtain the number of teeth multiply the pitch diameter by the diametral pitch.

If the diameter of the pitch circle is 10 inches and the diametral pitch is 4 multiply 10 by 4, and the product, 40, will be the number of teeth in the gear.

The whole diameter of the blank and the diametral pitch given, to obtain the number of teeth in the gear multiply the diameter by the diametral pitch and subtract 2.

If the whole diameter is 10½ and the diametral pitch is 4 multiply 10½ by 4 and the product, 42 less 2, or 40, is the number of teeth.

The thickness of a tooth at the pitch line is found by dividing the circular pitch by 2, or divide 1.57 by the diametral pitch.

If the circular pitch is 1.047 inches, or the diametral pitch is 3, divide 1.047 by 2 or 1.57 by 3, and the quotient, .523 inch, is the thickness of the tooth.

The whole depth of a tooth is found by dividing 2.157 by the diametral pitch.

If the diametral pitch of a gear is 6, the whole depth is 2.157 divided by 6, equals .3595.

The whole depth of a tooth is about 11-16, or exactly .6866 of the circular pitch.

If the circular pitch is 2 the whole depth of tooth is about 11-16 of 2 inches, or 1⅜ inches nearly.

The distance between the centers of two gears is found by adding the number of teeth together and dividing half the sum by the diametral pitch.

If two gears have 50 and 30 teeth, respectively, and are 5 pitch, add 50 and 30, making 80, divide by 2, and then divide the quotient, 40, by the diametral pitch, 5, and the result, 8 inches, is the center distance.

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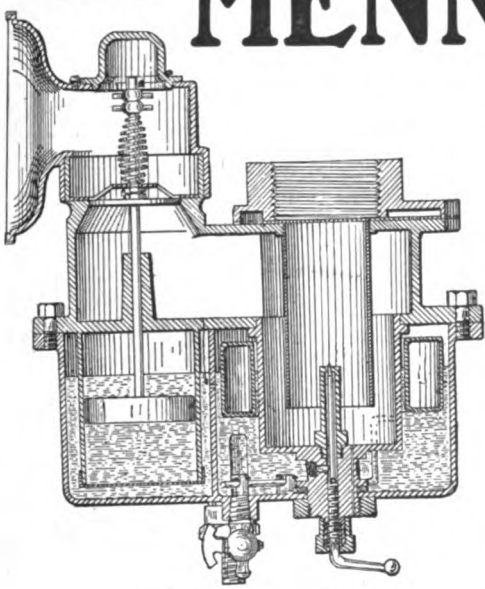

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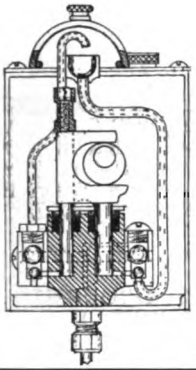

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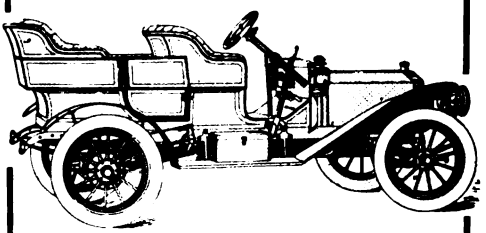

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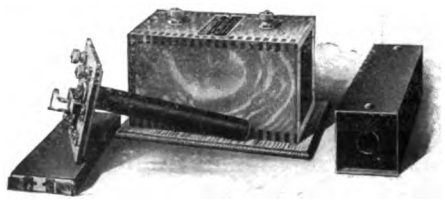

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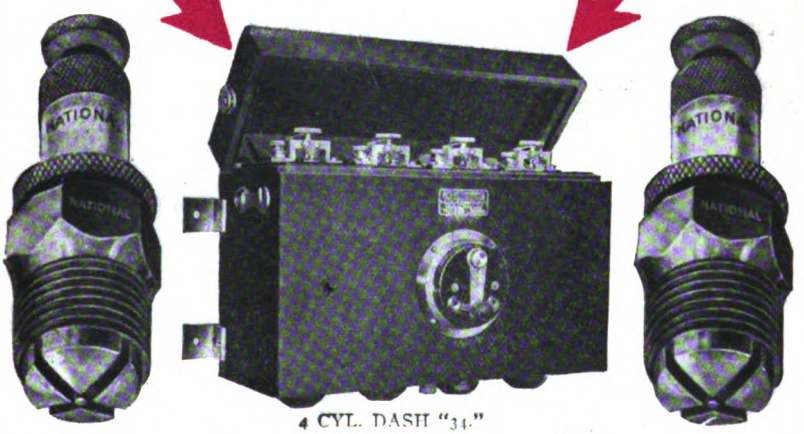

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